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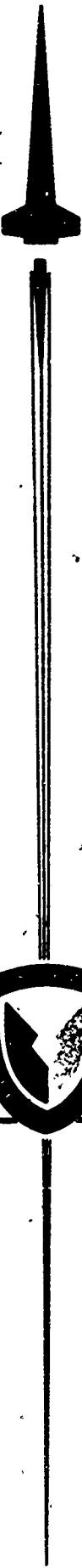| |
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Report No. RD-TM-70-6

AN EXPERIMENTAL INVESTIGATION OF BASE PRESSURE

ON A BODY OF REVOLUTION AT HIGH THRUST LEVELS

AND FREE STREAM MACH NUMBERS OF 1.5 TO 2.87

by

Joseph C. Craft
Charles E. Brazzel

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U.S. ARMY MISSILE COMMAND
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Aerodynamics Branch
Advanced Systems Laboratory
Research and Engineering Directorate
U. S. Army Missile Command
Redstone Arsenal, Alabama 35809

ABSTRACT

An investigation of axial jet effects on the base and afterbody pressures on a body of revolution has been made at free stream Mach numbers of 1.5, 1.75, 2.00, 2.50 and 2.87. Variations were made in nozzle and afterbody geometry while chamber pressures were varied from zero to 1000 psia. For the larger nozzles, sufficient jet mass flow was emitted to cause boundary layer separation on the body surface.

CONTENTS

iii

ILLUSTRATIONS

SYMBOLS

Text and Figures	Table		Units
M_j	MJ	Mach number of jet at exit plane	-
X/D_B	X/DB	Distance forward of base along center line over reference diameter	-
D_B		Reference diameter = 2.50 in.	in.
R/R_B	R/RB	Radial distance from center line divided by reference radius	-
P_C	PC	Nozzle chamber pressure	psia
P_∞	PF	Free stream static pressure	psia
P_b	PB	Mean base pressure	psia
M_∞	MF	Free stream Mach number	-
θ_j	THEJ	Nozzle angle at exit plane	deg
D_j/D_B	DJ/DB	Exit diameter of nozzle over reference diameter	-
C_T	CT	Nozzle thrust force coefficient (Eq 2)	-
R_N	RN/IN	Reynolds number	1×10^6/in
RMF	RMF	Nozzle momentum flux ratio (Eq 1)	-
p/P_∞	P(.)/PF	Measured orifice pressure over free stream static pressure	-
C_{P_B}	CPB	Mean base pressure coefficient	-
	FLO	Weight flow through nozzle, calculated	lb/sec

v

Text and Figures	Tables		Units
p_j		Jet static pressure	psia
A_j		Area of jet at exit plane	in.^2
A_B		Body reference area	in.^2
γ_j		Ratio of specific heats for jet	-
γ_∞		Ratio of specific heat for free stream	-
ϕ		Angular position on body in a plane normal to center line position clockwise looking forward	deg
q_∞		Free stream dynamic pressure	psia

1. INTRODUCTION

For several years, The Army Missile Command has been studying the problem of "Base Drag Reduction" under a supporting research task. References 1 through 11 document some of the results of the study which has been both theoretical and experimental. In reference 2 base pressure correlations with C_T and RMF are shown to be good above the thrust level where minimum base pressure occurs. However, base pressure is strongly dependent on free stream Mach number at thrust levels below the minimum point. A supersonic test at low thrust levels was conducted at Ballistic Research Laboratories to extend the base pressure correlation to higher Mach numbers (Reference 3). The present study was designed to extend the supersonic correlations to higher thrust levels. In addition to base pressures, surface pressures were measured to determine the flow separation due to an axial jet.

The tests were conducted in the Langley unitary tunnel. Nine nozzle configurations with varying chamber pressures were tested at free stream Mach numbers of 1.5, 1.75, 2.00, 2.50 and 2.87.

Pressures were measured at several orifices on the model base and averaged to obtain a mean base pressure. At high thrust levels, flow on the body may separate near the base; therefore, pressure measurements along the surface were made to help define the relationship between thrust level and separation point.

The test results are tabulated and the base pressures are plotted to show effects of the various independent parameters. Selected plots of surface pressure distributions are included to illustrate separation. Samples of schlierens also indicate a region of separation.

2. TEST FACILITY

The tests were conducted in the low speed circuit of the Unitary Plan Wind Tunnel of NASA, Langley Research Center. The facility is a continuous circuit wind tunnel with a 4 foot by 4 foot test section capable of operating at stagnation pressures up to 60 psia, and at Mach numbers of 1.50 to 2.87. For further details of the facility, see Reference 12. During the test the Reynolds number was held constant at 0.167×10^6 per inch and the stagnation temperature was constant at 150^0 F. Tunnel pressure was varied to maintain a constant Reynolds number. Listed below are free stream pressures

1

for the discrete Mach numbers. No transition strips were applied to the model.

M_α	1.50	1.75	2.00	2.50	2.87
p_∞, psia	2.10	1.56	1.17	0.69	0.472

The model was arranged in the test section so that the support strut was 30 degrees above horizontal and the sting support system was offset to the right side so that model center line was as close to the test section center line as physically possible.

Rocket exhaust was simulated by a jet of cold, dry air exhausting through the model nozzles from an air supply through the support strut. Flow rate was measured by an orifice plate in the air supply, and during the tests the temperature of the air supply varied from 40^0 F. to 80^0 F.

3. MODEL

The model was a 2.5-inch diameter body of revolution which was strut-mounted at zero angle of attack to the tunnel sting support system (Figure 1). The model consisted of a 4 caliber tangent ogive forebody followed by a 5.5 caliber cylindrical center-body and either a 1.5 caliber cylinder or a 2.1 caliber boattail. This resulted in total lengths of either 11 or 11.6 calibers. Configuration variation was achieved by varying nine nozzles - one sonic, six conical and two contour. A removable afterbody allowed model changes to be made by interchanging nozzles. Table 1 and Figure 2 describe the configurations tested. Conical nozzles were designed using one dimensional flow relationships whereas the contour nozzles, Table 2, were designed using a program based on the " method of characteristics" (Reference 13).

Pressure orifices were located on the model base and along the missile surface nearly opposite the strut. Table 3 shows the pressure orifice locations for the different configurations. Note that $\phi = 0$ is 180 degrees from the strut or -60 degrees from the top of the model when installed in tunnel.

2

4. PROCEDURE

All runs were made with the model fixed at zero angle of attack. For each run, the nozzle supply pressure was varied while test section Mach number and stagnation pressure were held constant. Model pressures and temperatures were recorded for each run. The nozzle settling chamber pressure and model static pressures were computed from transducer outputs. Mean base pressure values were obtained by integrating the local pressures across the model base area between the nozzle exit and the outer radius of the body.

Values of thrust force coefficient and momentum flux ratio presented in Table 4 were computed using measured stagnation conditions, nozzle geometry, and one dimensional flow relationships, as shown in the following equations:

$$ RMF = \frac{\gamma_j P_j A_j M_j^2}{\gamma_\infty P_\infty A_B M_\infty^2} \approx \frac{C_T}{2} \qquad (1) $$

$$ C_T = \frac{\gamma_j P_j A_j M_j^2 + A_j(P_j - P_\infty)}{1/2 \; \gamma_\infty P_\infty A_B M_\infty^2} = \frac{Thrust}{q_\infty A_B} \qquad (2) $$

5. RESULTS AND CONCLUSIONS

The wind tunnel tests described in this report were designed to measure pressures on the model base and along the surface of the afterbody. These pressures are presented in Table 4 with the calculated values of thrust force coefficient, momentum flux ratio, and average base pressure coefficient. The following table is a summary of the Mach numbers at which each configuration was tested.

Config	M_∞ 1.5	1.75	2.00	2.50	2.87
1.0-0-.45	X	X	X	X	X
2.7-20-.80	X		X	X	X
2.7-20-.30	X			X	
2.0-10-.80	X			X	
2.7-10-.80	X			X	
3.8-20-.80	X			X	
2.7-20-.45	X			X	
2.7-0-.80	X			X	
3.0-0-.46	X			X	X

3

The average base pressures are plotted as a function of chamber pressure arranged to show the effect of free stream Mach number (Figure 3). Figure 4 presents pressure distributions along the body surface and the missile base for constant chamber pressure for selected configurations. These plots illustrate the effect of thrust level on base pressure and surface pressures. Flow separation is associated with the high pressure regions which are exhibited on the body surfaces for the configurations having large nozzles with high thrust levels. The schlieren photographs in Figure 5 substantiate the existence of a region of separation. Note that the pressure measurement near the base cannot be used as a criterion for separation since it relates more closely to the base pressures than to the surface pressures.

The base pressures have been plotted in Figure 6 as a function of C_T to show the effects of jet exit Mach number, nozzle expansion angle, jet to body diameter ratio and nozzle profile.

In order to study the flow separation further, the pressure variation at station 7 was plotted as a function of C_T for various free stream Mach numbers (Figure 7). As discussed earlier, the pressure near the base does not reflect body pressures, but instead fluctuates with base pressure. A pressure ratio level of 1.2 was arbitrarily chosen as denoting separated flow. Figure 8 then represents the thrust force coefficient required for separation as a function of free stream Mach number. This merely describes the development at station 7 and rearward. To determine how far up the body separation has proceeded, similar analysis must be done at other pressure stations.

6. CONCLUSIONS

The results of these tests will be combined with other available data to extend the base drag correlation and to aid in developing better theoretical methods. Reference 9, which presents a theoretical method for estimating base pressure, uses some data from this test to verify the technique. A complete prediction technique will require a knowledge of flow conditions on the aft surface of the body including pressure and boundary layer. The results presented here indicate that standard methods will not be sufficient to predict the pressures for high thrust nozzles. The high pressures exhibited indicate a separated region on the base. This behavior must also be considered when stabilizing or controlling surfaces are located near the base. The most aft pressure orifice appears to reflect the base

pressure readings and probably does not indicate separated flow. But when more forward orifices show high pressures, there is little doubt that a separated region is present. This separation is substantiated by the schlieren photographs.

Table I. Model Geometry

Nozzle	$D*$	D_j	L	R	Θ_j	D_j/D_B	M_j
Sonic Nozzle:							
1.0-0-.45	-	1.125	-	-	0	0.450	1.0
Conical Nozzles:							
2.7-20-.80	1.123	2.004	1.309	0.562	20	0.800	2.7
2.7-20-.30	0.420	0.750	0.490	0.210	20	0.300	2.7
2.0-10-.80	1.5426	2.004	1.376	0.771	10	0.800	2.0
2.7-10-.80	1.1232	2.004	2.547	0.561	10	0.800	2.7
3.8-20-.80	0.6698	2.004	1.892	0.335	20	0.800	3.8
*2.7-20-.45	0.6305	1.125	0.735	0.315	20	0.450	2.7
Contour Nozzles:							
2.7-0-.80	1.124	2.004	4.406	0.562	0	0.800	2.7
*3.0-0-.46	0.554	1.140	2.721	0.277	0	0.456	3.0

*Tested with boattail afterbody

Note: All dimensions in inches.
Nozzle designation is as follows: $\left(M_j - \Theta_j - D_j/D_B \right)$

Table II. Contour Nozzle Profiles

3.0-0-.456		2.7-0-.80	
X	R	X	R
0.0	0.570	0.000	0.562
0.253	0.569	0.101	0.565
0.534	0.564	0.241	0.575
0.689	0.559	0.368	0.592
0.897	0.549	0.441	0.606
1.081	0.537	0.661	0.651
1.245	0.523	0.904	0.702
1.394	0.507	1.136	0.748
1.574	0.485	1.421	0.799
1.698	0.467	1.703	0.844
1.853	0.441	2.072	0.892
1.928	0.427	2.391	0.926
2.075	0.397	2.741	0.954
2.228	0.363	3.029	0.972
2.376	0.328	3.343	0.986
2.473	0.305	3.690	0.995
2.567	0.288	4.066	1.001
2.613	0.283	4.243	1.002
2.671	0.278	4.406	1.002
2.721	0.277		

Note: Dimensions in inches.

Table III. Pressure Orifice Locations

NOZZLE 2.7-20-.80
NOZZLE 2.7- 0-.80
NOZZLE 2.0-10-.80
NOZZLE 2.7-10-.80
NOZZLE 3.8-20-.80

2.7-20-.30
1.0- 0-.45

2.7-20-.45
3.0- 0-.457

NO	X/DB	R/RB	PHI	X/DB	R/RB	PHI	X/DB	R/RB	PHI
1	-	-	-	0.000	0.566	-5	0.000	0.556	-5
2	-	-	-	0.000	0.698	-5	0.000	0.656	-5
3	0.000	0.826	-5	0.000	0.788	-5	0.000	0.744	-5
4	0.000	0.900	-5	0.000	0.880	-5	0.000	0.822	-5
5	0.000	0.974	-5	0.000	0.960	-5	0.025	0.862	0
6	0.025	1.000	0	0.025	1.000	0	0.190	0.880	0
7	0.225	1.000	0	0.225	1.000	0	0.354	0.896	0
8	0.425	1.000	0	0.425	1.000	0	0.519	0.912	0
9	0.675	1.000	0	0.675	1.000	0	0.683	0.930	0
10	0.925	1.000	0	0.925	1.000	0	0.848	0.948	0
11	0.025	1.000	180	0.025	1.000	180	1.012	0.964	0
12	0.425	1.000	180	0.425	1.000	180	1.177	0.980	0
13	0.000	0.974	85	0.000	0.960	85	1.260	0.988	0
14	0.000	0.974	175	0.000	0.960	175	1.342	0.998	0
15	0.000	0.974	265	0.000	0.960	265	1.392	1.000	0
16	-	-	-				1.716	1.000	0
17	-	-	-				2.041	1.000	0

Table IV. Basic Test Data

MJ = 1.00   THEJ = 0.   DJ/DB = 0.450

MF   = 1.500
PF   = 2.141
RM/IN = .167

TC	79.903	77.126	73.653	71.223	68.098	66.014	64.278	61.848	58.028
FLO	----	0.344	0.477	0.746	1.323	1.868	2.340	3.133	3.263
PC	17.001	21.552	26.102	35.202	59.092	80.707	101.185	133.038	138.727
PC/PF	8.089	10.250	12.453	16.765	28.013	38.192	48.210	63.279	65.883
RMF	0.385	0.487	0.592	0.797	1.332	1.816	2.292	3.009	3.133
CT	1.190	1.542	1.902	2.604	4.438	6.097	7.731	10.187	10.612
PB/PF	0.5380	0.5940	0.6407	0.7323	0.8988	1.0353	1.1458	1.2942	1.3141
CPB	-0.2933	-0.2578	-0.2281	-0.1700	-0.0643	0.0224	0.0925	0.1868	0.1994
P1/PF	0.5547	0.6080	0.6559	0.7464	0.9129	1.0499	1.1594	1.3052	1.3230
P2/PF	0.5390	0.5924	0.6428	0.7333	0.8998	1.0395	1.1515	1.2974	1.3204
P3/PF	0.5338	0.5898	0.6375	0.7307	0.8972	1.0343	1.1463	1.2947	1.3178
P4/PF	0.5312	0.5898	0.6323	0.7255	0.8920	1.0265	1.1358	1.2895	1.3047
P5/PF	0.5312	0.5898	0.6349	0.7255	0.8920	1.0265	1.1358	1.2843	1.3047
P6/PF	0.8896	0.8951	0.8921	0.8957	0.9129	0.9821	1.0597	1.2110	1.2393
P7/PF	1.0048	1.0047	0.9970	0.9978	0.9887	0.9926	0.9915	0.9940	0.9935
P8/PF	0.9943	0.9943	0.9918	0.9926	0.9835	0.9900	0.9863	0.9887	0.9883
P9/PF	0.9734	0.9734	0.9734	0.9743	0.9704	0.9770	0.9784	0.9756	0.9752
P10/PF	0.9917	0.9943	0.9918	0.9926	0.9887	0.9926	0.9942	0.9940	0.9935
P11/PF	0.9524	0.9525	0.9524	0.9533	0.9573	1.0134	1.0702	1.2006	1.2288
P12/PF	1.0519	1.0517	1.0495	1.0502	1.0437	1.0499	1.0466	1.0489	1.0484
P13/PF	0.5128	0.6028	0.6480	0.7412	0.9077	1.0655	1.1515	1.3026	1.3230
P14/PF	0.5128	0.6002	0.6480	0.7412	0.9103	1.0759	1.1568	1.2974	1.3178
P15/PF	0.5155	0.6054	0.6533	0.7464	0.9181	1.0785	1.1620	1.3052	1.3282
TC	54.903	52.473	50.737	49.348	48.653	50.389	54.209	61.848	65.667
FLO	3.598	4.111	4.652	5.808	7.104	8.435	9.633	10.922	11.504
PC	152.833	174.448	196.973	244.072	297.997	355.107	406.985	464.322	488.668
PC/PF	72.505	82.581	93.044	114.586	139.605	156.721	178.336	206.316	227.538
RMF	3.447	3.926	4.424	5.448	6.638	7.452	8.479	9.810	10.819
CT	11.691	13.334	15.039	18.551	22.630	25.420	28.943	33.505	36.964
PB/PF	1.3680	1.4271	1.4822	1.5616	1.6233	1.6450	1.6709	1.6924	1.7009
CPB	0.2337	0.2712	0.3062	0.3566	0.3957	0.4095	0.4260	0.4396	0.4450
P1/PF	1.3947	1.4334	1.4962	1.5792	1.6352	1.6503	1.6723	1.6885	1.6938
P2/PF	1.3764	1.4308	1.4911	1.5740	1.6352	1.6503	1.6747	1.6860	1.6938
P3/PF	1.3660	1.4308	1.4858	1.5663	1.6326	1.6528	1.6747	1.6983	1.7014
P4/PF	1.3503	1.4230	1.4729	1.5508	1.6171	1.6455	1.6747	1.6983	1.7092
P5/PF	1.3529	1.4178	1.4651	1.5378	1.5965	1.6261	1.6579	1.6909	1.7066
P6/PF	1.3137	1.3787	1.4391	1.5223	1.5758	1.5921	1.6024	1.6103	1.6065
P7/PF	0.9951	0.9929	1.0001	1.0959	1.4056	1.4902	1.5446	1.5883	1.6117
P8/PF	0.9873	0.9877	0.9871	0.9848	0.9904	1.0824	1.3133	1.4905	1.5501
P9/PF	0.9768	0.9773	0.9767	0.9770	0.9723	0.9732	0.9808	1.0067	1.1497
P10/PF	0.9951	0.9929	0.9975	0.9951	0.9904	0.9878	0.9976	1.0018	1.0060
P11/PF	1.2824	1.3578	1.4157	1.4810	1.5242	1.5387	1.5687	1.6005	1.6245
P12/PF	1.0473	1.0503	1.0520	1.1243	1.3386	1.3931	1.4458	1.4930	1.5264
P13/PF	1.3712	1.4308	1.4833	1.5249	1.5707	1.5872	1.6314	1.6713	1.7040
P14/PF	1.3686	1.4099	1.4443	1.4887	1.5423	1.5484	1.5807	1.6152	1.6398
P15/PF	1.3790	1.4151	1.4521	1.4913	1.5423	1.5484	1.5904	1.6372	1.6732

Table IV. (Continued)

MJ = 1.00   THEJ = 0.   DJ/DB = 0.450

MF = 1.750
PF = 1.571
RN/IN = .167

TC	77.820	75.389	72.264	68.792	66.362	64.626	62.889	61.153	59.417
FLO	----	0.347	0.527	0.827	1.378	1.905	2.422	2.982	3.210
PC	15.873	19.286	26.112	37.488	60.696	82.993	104.608	127.361	137.600
PC/PF	10.102	12.274	16.822	24.112	38.967	53.104	66.778	81.588	88.088
RMF	0.353	0.429	0.588	0.842	1.361	1.855	2.333	2.850	3.077
CT	1.115	1.376	1.920	2.793	4.573	6.266	7.903	9.677	10.456
PB/PF	0.5375	0.6114	0.6490	0.7470	0.9412	1.0843	1.2061	1.3271	1.3536
CPB	-0.2158	-0.1813	-0.1637	-0.1180	-0.0274	0.0393	0.0962	0.1526	0.1649
P1/PF	0.5597	0.6327	0.6681	0.7781	0.9603	1.1026	1.2265	1.3433	1.3670
P2/PF	0.5354	0.6087	0.6469	0.7604	0.9426	1.0885	1.2125	1.3292	1.3599
P3/PF	0.5319	0.6052	0.6433	0.7534	0.9391	1.0850	1.2090	1.3292	1.3529
P4/PF	0.5284	0.6052	0.6433	0.7499	0.9320	1.0744	1.1949	1.3222	1.3458
P5/PF	0.5319	0.6052	0.6433	0.6933	0.9320	1.0709	1.1879	1.3117	1.3423
P6/PF	0.9109	0.9353	0.9049	0.9020	0.9250	0.9969	1.0789	1.1749	1.2045
P7/PF	1.0186	1.0419	1.0109	1.0045	1.0062	1.0040	1.0016	1.0171	0.9996
P8/PF	1.0256	1.0487	1.0145	1.0081	1.0097	1.0040	1.0087	1.0171	0.9996
P9/PF	1.0013	1.0281	0.9933	0.9903	0.9885	0.9863	0.9876	0.9996	0.9820
P10/PF	1.0186	1.0453	1.0145	1.0081	1.0062	1.0040	1.0087	1.0171	0.9996
P11/PF	0.9804	1.0041	0.9685	0.9656	0.9709	1.0075	1.0824	1.1609	1.1833
P12/PF	1.0847	1.1072	1.0746	1.0682	1.0697	1.0674	1.0684	1.0802	1.0632
P13/PF	0.5423	0.6155	0.6610	0.7640	0.9426	1.0850	1.2054	1.3327	1.3776
P14/PF	0.5354	0.6121	0.6540	0.7604	0.9426	1.0885	1.2090	1.3363	1.3846
P15/PF	0.5493	0.6224	0.6681	0.7746	0.9567	1.1026	1.2195	1.3503	1.3952

TC	57.681	55.945	55.251	55.598	58.376	62.195	66.362	69.487
FLD	3.539	4.094	4.649	5.673	7.015	8.385	9.595	10.972
PC	151.479	175.142	197.667	240.898	298.463	357.165	409.725	468.655
PC/PF	96.892	111.814	125.963	152.776	188.426	224.579	254.724	294.755
RMF	3.385	3.906	4.400	5.337	6.582	7.845	8.898	10.297
CT	11.510	13.297	14.992	18.203	22.473	26.803	30.413	35.208
PB/PF	1.4193	1.4958	1.5531	1.6445	1.7377	1.7884	1.8209	1.8636
CPB	0.1956	0.2313	0.2580	0.3006	0.3441	0.3678	0.3829	0.4028
P1/PF	1.4355	1.5078	1.5665	1.6550	1.7467	1.7981	1.8270	1.8683
P2/PF	1.4250	1.5043	1.5594	1.6514	1.7398	1.7911	1.8202	1.8581
P3/PF	1.4214	1.5008	1.5594	1.6514	1.7467	1.7981	1.8270	1.8683
P4/PF	1.4109	1.4902	1.5454	1.6410	1.7398	1.7911	1.8270	1.8683
P5/PF	1.4039	1.4762	1.5349	1.6235	1.7154	1.7635	1.8031	1.8547
P6/PF	1.2846	1.3848	1.4683	1.5816	1.6771	1.7185	1.7451	1.7729
P7/PF	1.0143	1.0087	1.0092	1.0090	1.0787	1.4212	1.5880	1.6979
P8/PF	1.0108	1.0087	1.0092	1.0090	1.0091	1.0027	1.0245	1.2956
P9/PF	0.9933	0.9876	0.9882	0.9916	0.9917	0.9890	0.9938	1.0296
P10/PF	1.0143	1.0087	1.0092	1.0090	1.0091	1.0027	1.0108	1.0467
P11/PF	1.2319	1.3743	1.4999	1.5816	1.6354	1.6597	1.6768	1.7150
P12/PF	1.0740	1.0720	1.0723	1.0719	1.1030	1.4004	1.5436	1.6297
P13/PF	1.4250	1.5078	1.5665	1.6514	1.7293	1.7566	1.7929	1.8445
P14/PF	1.4285	1.4937	1.5419	1.5991	1.6493	1.6736	1.7075	1.7456
P15/PF	1.4390	1.5008	1.5419	1.6026	1.6771	1.7151	1.7588	1.8104

10

Table IV. (Continued)

MJ = 1.00   THEJ = 0.   DJ/DB = 0.450

MF   = 2.000
PF   = 1.179
RN/IN =   .167

TC	64.278	60.806	57.681	55.251	52.126	50.389	50.389	51.431
FLO	0.477	0.883	1.571	2.363	2.948	4.346	5.682	7.024
PC	26.120	40.910	69.351	101.660	126.233	186.073	241.134	297.562
PC/PF	22.166	34.901	59.187	86.748	107.472	158.911	205.531	252.443
RMF	0.593	0.933	1.583	2.320	2.874	4.250	5.497	6.752
CT	1.960	3.128	5.355	7.882	9.783	14.500	18.774	23.076
PB/PF	0.6513	0.8069	1.0306	1.2374	1.3608	1.6089	1.7428	1.8440
CPB	-0.1245	-0.0690	0.0109	0.0848	0.1289	0.2175	0.2653	0.3014
P1/PF	0.6821	0.8360	1.0654	1.2637	1.3889	1.6362	1.7664	1.8682
P2/PF	0.6494	0.8079	1.0325	1.2403	1.3654	1.6174	1.7522	1.8495
P3/PF	0.6447	0.8032	1.0278	1.2403	1.3608	1.6127	1.7522	1.8495
P4/PF	0.6400	0.7937	1.0137	1.2261	1.3514	1.5986	1.7334	1.8402
P5/PF	0.6400	0.7937	1.0137	1.2167	1.3374	1.5798	1.7100	1.8122
P6/PF	0.9110	0.9205	0.9621	1.0946	1.1684	1.4528	1.6395	1.7655
P7/PF	1.0091	1.0098	1.0043	1.0054	1.0042	1.0061	1.0053	1.0229
P8/PF	1.0091	1.0098	1.0090	1.0101	1.0089	1.0061	1.0100	1.0229
P9/PF	0.9951	0.9957	0.9950	0.9960	0.9901	0.9921	0.9912	1.0042
P10/PF	1.0138	1.0192	1.0137	1.0194	1.0136	1.0155	1.0147	1.0229
P11/PF	0.9437	0.9487	0.9715	1.0993	1.1637	1.4058	1.6724	1.7048
P12/PF	1.0512	1.0568	1.0513	1.0570	1.0511	1.0532	1.0570	1.0649
P13/PF	0.6540	0.8173	1.0419	1.2403	1.3561	1.6174	1.7617	1.8402
P14/PF	0.6494	0.8079	1.0466	1.2449	1.3654	1.5986	1.6771	1.7234
P15/PF	0.6634	0.8267	1.0607	1.2543	1.3795	1.6174	1.7053	1.7561

TC	54.556	59.070	66.014	67.751
FLO	8.516	9.659	10.819	1.674
PC	361.270	411.100	462.294	488.005
PC/PF	309.709	344.844	383.816	407.052
RMF	8.283	9.223	10.265	10.887
CT	28.327	31.549	35.123	37.253
PB/PF	1.9133	1.9461	1.9819	1.9838
CPB	0.3262	0.3379	0.3507	0.3513
P1/PF	1.9351	1.9627	1.9974	1.9902
P2/PF	1.9209	1.9488	1.9837	1.9810
P3/PF	1.9209	1.9581	1.9883	1.9856
P4/PF	1.9114	1.9488	1.9883	1.9902
P5/PF	1.8784	1.9119	1.9517	1.9718
P6/PF	1.8406	1.8657	1.8832	1.8794
P7/PF	1.0855	1.3023	1.6226	1.7039
P8/PF	1.0100	1.0114	1.0147	1.0067
P9/PF	0.9911	0.9929	0.9964	0.9790
P10/PF	1.0148	1.0160	1.0147	1.0021
P11/PF	1.7274	1.7364	1.7552	1.7362
P12/PF	1.3498	1.5655	1.6500	1.6624
P13/PF	1.8831	1.9027	1.9289	1.9302
P14/PF	1.7510	1.7733	1.8009	1.7963
P15/PF	1.8218	1.8750	1.9151	1.9256

Table IV. (Continued)

MJ = 1.00   THEJ = 0.   DJ/DB = 0.450

MF = 2.500
PF = .690
RN/IN = .167

TC	69.751	68.362	66.626	64.889	63.501	60.723	57.598	50.655
FLO	0.069	0.482	0.880	1.336	1.897	2.530	2.986	3.665
PC	19.264	26.989	39.741	59.080	82.289	109.138	127.340	155.554
PC/PF	27.947	37.854	57.614	85.718	119.018	157.730	184.601	225.448
RMF	0.478	0.648	0.986	1.467	2.037	2.700	3.160	3.859
CT	1.594	2.175	3.335	4.984	6.938	9.210	10.787	13.184
PB/PF	0.5910	0.6736	0.8286	1.0183	1.2163	1.3973	1.5239	1.6790
CPB	-0.0935	-0.0746	-0.0392	0.0042	0.0494	0.0908	0.1197	0.1552
P1/PF	0.6513	0.7308	0.8810	1.0723	1.2750	1.4400	1.5716	1.7139
P2/PF	0.5799	0.6672	0.8254	1.0168	1.2194	1.4005	1.5239	1.6743
P3/PF	0.5799	0.6593	0.8176	1.0088	1.2116	1.4005	1.5239	1.6823
P4/PF	0.5719	0.6593	0.8095	1.0009	1.2037	1.3846	1.5159	1.6743
P5/PF	0.5719	0.6513	0.8095	0.9929	1.1719	1.3609	1.4843	1.6505
P6/PF	0.8975	0.8977	0.9049	0.9452	1.0691	1.2027	1.2779	1.4282
P7/PF	1.0007	1.0009	1.0000	1.0000	0.9978	0.9970	1.0000	1.0077
P8/PF	1.0007	1.0009	0.9922	0.9929	0.9978	0.9970	1.0000	0.9999
P9/PF	0.9848	0.9850	0.9763	0.9770	0.9819	0.9811	0.9841	0.9840
P10/PF	1.0007	1.0009	0.9922	0.9929	0.9978	0.9970	1.0000	0.9999
P11/PF	0.9293	0.9293	0.9286	0.9452	1.0373	1.2027	1.2670	1.3489
P12/PF	1.0325	1.0327	1.0318	1.0327	1.0294	1.0286	1.0397	1.0395
P13/PF	0.5878	0.6672	0.8176	1.0168	1.1719	1.3846	1.5080	1.6664
P14/PF	0.5799	0.6593	0.8176	1.0088	1.1641	1.3846	1.5080	1.6664
P15/PF	0.6354	0.7149	0.8572	1.0486	1.1957	1.4164	1.5476	1.7060

TC	47.876	45.098	44.056	44.403	46.487	51.001	58.987	64.195
FLO	4.147	4.694	5.849	7.130	8.591	9.764	11.003	1.701
PC	175.805	197.874	245.656	299.353	360.559	411.526	467.044	500.718
PC/PF	254.753	286.329	356.476	433.988	522.783	595.769	675.109	718.635
RMF	4.361	4.901	6.102	7.429	8.948	10.198	11.556	12.301
CT	14.904	16.757	20.874	25.423	30.634	34.917	39.574	42.128
PB/PF	1.7708	1.8744	2.0323	2.1478	2.2243	2.2605	2.2776	2.2898
CPB	0.1762	0.1999	0.2359	0.2624	0.2798	0.2881	0.2920	0.2948
P1/PF	1.8009	1.9094	2.0577	2.1749	2.2465	2.2748	2.2950	2.3180
P2/PF	1.7612	1.8697	2.0259	2.1431	2.2147	2.2511	2.2555	2.2788
P3/PF	1.7692	1.8776	2.0339	2.1509	2.2227	2.2589	2.2712	2.2788
P4/PF	1.7771	1.8776	2.0418	2.1590	2.2386	2.2748	2.2871	2.2945
P5/PF	1.7453	1.8379	2.0021	2.1113	2.1990	2.2430	2.2793	2.2788
P6/PF	1.5470	1.6478	1.8511	2.0161	2.0958	2.1163	2.1289	2.1373
P7/PF	1.0076	1.0062	1.0089	1.0240	1.1907	1.5456	1.8755	1.9565
P8/PF	0.9997	0.9982	1.0011	1.0000	1.0002	1.0065	1.0368	1.0528
P9/PF	0.9838	0.9824	0.9852	0.9841	0.9843	0.9828	0.9812	0.9823
P10/PF	0.9997	0.9982	1.0011	1.0000	1.0002	0.9987	0.9971	0.9980
P11/PF	1.4200	1.6478	1.8432	1.8572	1.8894	1.9102	1.9152	1.9172
P12/PF	1.0313	1.0378	1.0407	1.0954	1.5003	1.7517	1.8044	1.8072
P13/PF	1.7534	1.8379	1.9782	2.0558	2.1036	2.1559	2.1764	2.1373
P14/PF	1.7216	1.7667	1.8432	1.8971	1.9369	1.9657	2.0023	1.9958
P15/PF	1.8009	1.8538	1.9068	1.9763	2.0640	-2.1241	2.1843	2.1844

Table IV. (Continued)

MJ = 1.00   THEJ = 0.   DJ/DB = 0.450

MF = 2.870
PF = .473
RN/IN = .167

TC	67.320	65.931	65.237	63.848	62.459	61.070	58.987	56.903	54.820
FLO	----	0.490	0.843	1.340	1.926	2.464	2.861	3.278	3.616
PC	19.722	25.410	38.607	59.085	82.974	105.728	121.655	139.629	153.509
PC/PF	41.767	53.885	81.763	125.193	175.461	224.035	257.533	295.454	324.428
RMF	0.542	0.700	1.062	1.626	2.279	2.910	3.345	3.837	4.214
CT	1.825	2.364	3.606	5.540	7.778	9.941	11.433	13.122	14.412
PB/PF	0.6572	0.7181	0.8409	1.0673	1.2892	1.4649	1.6051	1.7200	1.8381
CPB	-0.0594	-0.0489	-0.0276	0.0117	0.0501	0.0806	0.1049	0.1249	0.1453
P1/PF	0.7406	0.8109	0.9265	1.1460	1.3631	1.5297	1.6767	1.7685	1.9050
P2/PF	0.6364	0.6950	0.8224	1.0533	1.2822	1.4603	1.5958	1.6991	1.8358
P3/PF	0.6364	0.6950	0.8224	1.0533	1.2822	1.4603	1.5958	1.6991	1.8358
P4/PF	0.6364	0.6950	0.8224	1.0418	1.2707	1.4603	1.6073	1.7338	1.8358
P5/PF	0.6364	0.6950	0.8109	1.0418	1.2477	1.4138	1.5496	1.6761	1.7779
P6/PF	0.9024	0.9036	0.9033	0.9606	1.1321	1.2517	1.3299	1.4102	1.4893
P7/PF	1.0065	1.0077	0.9960	1.0071	1.0050	0.9966	1.0062	1.0056	1.0044
P8/PF	0.9950	0.9963	0.9845	0.9954	0.9935	0.9851	0.9944	0.9941	0.9929
P9/PF	0.9833	0.9963	0.9845	0.9839	0.9818	0.9733	0.9830	0.9827	0.9815
P10/PF	1.0065	1.0077	0.9960	0.9954	1.0050	0.9966	0.9944	1.0056	1.0044
P11/PF	0.9024	0.9036	0.8918	0.9492	1.1551	1.2746	1.3299	1.4102	1.4663
P12/PF	1.0065	1.0077	0.9960	1.0071	1.0050	0.9966	1.0062	1.0056	1.0044
P13/PF	0.6364	0.6950	0.8224	1.0533	1.2707	1.4252	1.5496	1.6761	1.7549
P14/PF	0.6246	0.6835	0.8224	1.0533	1.2707	1.4370	1.5611	1.6991	1.7664
P15/PF	0.7173	0.7762	0.9033	1.1228	1.3401	1.5065	1.6305	1.7570	1.8473

TC	51.695	51.348	52.042	54.126	58.292	62.806	68.014	70.098
FLO	4.036	4.626	5.748	7.073	8.420	9.687	10.702	11.143
PC	171.484	196.513	242.929	299.357	356.922	411.985	457.036	478.651
PC/PF	363.018	415.495	512.613	634.177	754.399	868.542	963.052	1004.412
RMF	4.715	5.396	6.658	8.237	9.798	11.281	12.508	13.045
CT	16.130	18.467	22.792	28.205	33.558	38.641	42.850	44.692
PB/PF	1.9496	2.0536	2.2593	2.4071	2.4801	2.5130	2.5255	2.5220
CPB	0.1647	0.1827	0.2184	0.2440	0.2567	0.2624	0.2646	0.2640
P1/PF	2.0236	2.0930	2.3056	2.4417	2.5172	2.5453	2.5555	2.5676
P2/PF	1.9427	2.0351	2.2361	2.3723	2.4478	2.4761	2.4979	2.4876
P3/PF	1.9427	2.0583	2.2594	2.3955	2.4592	2.4876	2.4979	2.4991
P4/PF	1.9427	2.0698	2.2709	2.4303	2.5054	2.5220	2.5323	2.5220
P5/PF	1.8965	2.0118	2.2247	2.3955	2.4710	2.5338	2.5441	2.5335
P6/PF	1.5958	1.7229	1.9943	2.2220	2.2977	2.3035	2.3367	2.3270
P7/PF	1.0062	1.0059	1.0144	1.0415	1.2933	1.7622	2.0146	2.0635
P8/PF	0.9944	0.9830	0.9914	0.9954	1.0044	1.0135	1.0361	1.0545
P9/PF	0.9830	0.9712	0.9800	0.9836	0.9815	0.9790	0.9784	0.9860
P10/PF	1.0062	0.9944	1.0029	1.0068	1.0044	1.0020	1.0014	0.9972
P11/PF	1.7114	1.8385	1.9019	1.9327	1.9282	1.9119	1.8878	1.8799
P12/PF	1.0177	1.0059	1.0258	1.4120	1.7896	1.8428	1.8533	1.8684
P13/PF	1.8736	1.9542	2.1211	2.2681	2.3439	2.3723	2.3943	2.3958
P14/PF	1.8388	1.8733	1.9481	2.0136	2.0553	2.0961	2.1525	2.1779
P15/PF	1.9774	2.0118	2.0979	2.1987	2.2977	2.3723	2.4173	2.4188

Table IV. (Continued)

MJ = 3.)) THEJ = 0. DJ/DB = 0.457

MF = 1.500
PF = 2.097
RN/IN = .167

TC	75.001	69.445	65.278	62.348	61.459	60.764	60.764	61.112
FLO	----	----	----	0.525	1.047	1.431	1.771	2.430
PC	35.345	73.457	130.909	188.929	246.381	303.833	360.715	468.793
PC/PF	16.920	35.087	62.316	89.976	117.772	144.972	172.378	223.621
RMF	0.385	0.798	1.417	2.046	2.670	3.297	3.920	5.085
CT	0.698	1.590	2.926	4.284	5.649	6.984	8.329	10.845
PB/PF	0.6114	0.5511	0.5651	0.5812	0.5953	0.6114	0.6322	0.6675
CPB	-0.2467	-0.2850	-0.2761	-0.2659	-0.2570	-0.2467	-0.2335	-0.2111
P1/PF	0.5769	0.5114	0.5308	0.5468	0.5654	0.5829	0.6070	0.6456
P2/PF	0.5583	0.4907	0.5070	0.5310	0.5468	0.5670	0.5885	0.6324
P3/PF	0.7284	0.6863	0.6918	0.7001	0.7088	0.7191	0.7316	0.7541
P4/PF	0.5822	0.5167	0.5308	0.5468	0.5601	0.5776	0.6018	0.6377
P5/PF	0.8480	0.8479	0.8476	0.8507	0.8494	0.8505	0.8509	0.8547
P6/PF	0.9331	0.9353	0.9374	0.9378	0.9344	0.9327	0.9331	0.9341
P7/PF	0.9198	0.9247	0.9242	0.9273	0.9264	0.9247	0.9278	0.9261
P8/PF	0.9171	0.9194	0.9189	0.9220	0.9211	0.9194	0.9225	0.9235
P9/PF	0.9171	0.9168	0.9189	0.9193	0.9185	0.9168	0.9172	0.9182
P10/PF	0.9038	0.9035	0.9057	0.9035	0.9025	0.9009	0.9013	0.9023
P11/PF	0.8773	0.8770	0.8767	0.8770	0.8733	0.8744	0.8721	0.8732
P12/PF	0.8985	0.9035	0.9004	0.9061	0.9052	0.9036	0.9039	0.9049
P13/PF	0.8746	0.8770	0.8767	0.8797	0.8786	0.8797	0.8827	0.8811
P14/PF	0.8906	0.8929	0.8925	0.8955	0.8946	0.8929	0.8960	0.8970
P15/PF	0.9464	0.9486	0.9480	0.9537	0.9530	0.9512	0.9543	0.9526
P16/PF	0.9783	0.9803	0.9797	0.9801	0.9821	0.9804	0.9835	0.9817
P17/PF	1.0102	1.0095	1.0113	1.0118	1.0140	1.0122	1.0153	1.0134

TC	62.848	65.278	69.098	72.223	73.959	73.959
FLO	3.080	3.747	4.429	5.059	5.720	6.333
PC	580.568	694.617	816.631	924.424	1040.465	1145.129
PC/PF	277.465	331.283	389.475	440.091	493.955	543.937
RMF	6.309	7.533	8.856	10.007	11.232	12.369
CT	13.488	16.130	18.986	21.471	24.115	26.568
PB/PF	0.7012	0.7355	0.7681	0.7988	0.8282	0.8563
CPB	-0.1897	-0.1680	-0.1473	-0.1277	-0.1091	-0.0912
P1/PF	0.6840	0.7222	0.7575	0.7922	0.8243	0.8590
P2/PF	0.6707	0.7090	0.7495	0.7817	0.8164	0.8484
P3/PF	0.7741	0.7963	0.8184	0.8398	0.8612	0.8774
P4/PF	0.6760	0.7143	0.7469	0.7817	0.8111	0.8405
P5/PF	0.8536	0.8545	0.8528	0.8583	0.8585	0.8642
P6/PF	0.9332	0.9339	0.9323	0.9322	0.9249	0.9354
P7/PF	0.9279	0.9259	0.9243	0.9269	0.9270	0.9301
P8/PF	0.9226	0.9259	0.9243	0.9243	0.9243	0.9275
P9/PF	0.9173	0.9154	0.9111	0.9137	0.9112	0.9117
P10/PF	0.9013	0.8995	0.8979	0.9005	0.8980	0.8985
P11/PF	0.8722	0.8730	0.8714	0.8715	0.8717	0.8721
P12/PF	0.9040	0.9074	0.9031	0.9058	0.9085	0.9117
P13/PF	0.8802	0.8810	0.8793	0.8794	0.8822	0.8827
P14/PF	0.8961	0.8968	0.8925	0.8952	0.8954	0.8985
P15/PF	0.9544	0.9524	0.9508	0.9507	0.9507	0.9538
P16/PF	0.9835	0.9815	0.9799	0.9824	0.9823	0.9881
P17/PF	1.0127	1.0132	1.0091	1.0114	1.0086	1.0144

14

Table IV. (Continued)

MJ = 3.00   THEJ = 0.   DJ/DB = 0.457

MF   = 2.500
PF   = .689
RN/IN = .167

TC	58.681	55.209	52.084	50.348	49.306	48.612	47.917	47.917
FLO	----	----	----	0.642	1.047	1.432	1.775	2.453
PC	34.209	74.027	130.910	192.342	240.124	300.420	354.458	467.086
PC/PF	49.685	107.428	189.764	279.277	347.670	436.331	515.182	677.839
RMF	0.407	0.879	1.553	2.286	2.846	3.572	4.217	5.549
CT	0.830	1.851	3.306	4.888	6.096	7.663	9.056	11.931
PB/PF	0.4150	0.4312	0.4665	0.4819	0.4946	0.5218	0.5484	0.5798
CPB	-0.1337	-0.1300	-0.1219	-0.1184	-0.1155	-0.1093	-0.1032	-0.0961
P1/PF	0.4191	0.4434	0.4825	0.5001	0.5148	0.5479	0.5806	0.6120
P2/PF	0.2659	0.2901	0.3298	0.3629	0.3779	0.4109	0.4436	0.4912
P3/PF	0.6366	0.6448	0.6675	0.6614	0.6675	0.6769	0.6935	0.7086
P4/PF	0.3385	0.3467	0.3861	0.4032	0.4183	0.4512	0.4758	0.5073
P5/PF	0.7897	0.7819	0.7882	0.7824	0.7882	0.7897	0.7904	0.7892
P6/PF	0.8623	0.8545	0.8686	0.8550	0.8606	0.8623	0.8628	0.8697
P7/PF	0.8623	0.8545	0.8686	0.8550	0.8526	0.8623	0.8628	0.8616
P8/PF	0.8543	0.8464	0.8606	0.8469	0.8526	0.8543	0.8548	0.8536
P9/PF	0.8543	0.8545	0.8606	0.8550	0.8526	0.8543	0.8548	0.8616
P10/PF	0.8543	0.8625	0.8606	0.8550	0.8606	0.8623	0.8628	0.8616
P11/PF	0.8543	0.8545	0.8606	0.8469	0.8526	0.8543	0.8548	0.8536
P12/PF	0.8864	0.8868	0.8927	0.8873	0.8847	0.8864	0.8871	0.8938
P13/PF	0.8704	0.8705	0.8847	0.8710	0.8767	0.8704	0.8791	0.8777
P14/PF	0.9027	0.9028	0.9008	0.9033	0.9008	0.9027	0.9114	0.9098
P15/PF	0.9671	0.9674	0.9732	0.9679	0.9652	0.9671	0.9758	0.9742
P16/PF	0.9831	0.9915	0.9893	0.9840	0.9893	0.9912	0.9920	0.9905
P17/PF	1.0074	1.0158	1.0216	1.0082	1.0134	1.0074	1.0161	1.0146

TC	49.306	52.084	55.903	59.376	62.848	65.278
FLO	3.178	3.880	4.461	5.128	5.782	6.419
PC	587.109	707.416	813.787	926.131	1041.886	1151.670
PC/PF	851.514	1027.152	1179.651	1342.897	1508.788	1660.051
RMF	6.970	8.408	9.657	10.993	12.351	13.590
CT	14.998	18.104	20.799	23.684	26.615	29.288
PB/PF	0.6196	0.6546	0.6910	0.7305	0.7481	0.7901
CPB	-0.0869	-0.0790	-0.0706	-0.0616	-0.0576	-0.0480
P1/PF	0.6518	0.6928	0.7391	0.7866	0.8124	0.8459
P2/PF	0.5391	0.5881	0.6267	0.6664	0.6918	0.7422
P3/PF	0.7323	0.7412	0.7632	0.7866	0.7883	0.8220
P4/PF	0.5553	0.5961	0.6347	0.6824	0.6998	0.7501
P5/PF	0.7965	0.7895	0.7954	0.8107	0.7964	0.8059
P6/PF	0.8690	0.8620	0.8676	0.8750	0.8608	0.8779
P7/PF	0.8690	0.8620	0.8676	0.8750	0.8608	0.8779
P8/PF	0.8610	0.8540	0.8516	0.8669	0.8526	0.8618
P9/PF	0.8610	0.8540	0.8596	0.8669	0.8526	0.8698
P10/PF	0.8610	0.8620	0.8676	0.8669	0.8526	0.8698
P11/PF	0.8610	0.8540	0.8516	0.8589	0.8446	0.8618
P12/PF	0.8931	0.8862	0.8837	0.8991	0.8769	0.8938
P13/PF	0.8770	0.8782	0.8757	0.8830	0.8688	0.8857
P14/PF	0.9093	0.9103	0.8999	0.9151	0.9009	0.9098
P15/PF	0.9736	0.9748	0.9722	0.9794	0.9654	0.9816
P16/PF	0.9978	0.9910	0.9883	1.0035	0.9894	0.9975
P17/PF	1.0139	1.0151	1.0123	1.0195	1.0055	1.0135

Table IV. (Continued).

XJ = 3.00   THEJ = 0.   OJ/OB = 0.457

MF   = 2.870
PF   = .472
RW/IN = .167

TC	62.501	61.112	59.028	58.334	58.334	58.681	59.376	61.112
FLO	----	----	----	0.632	1.029	1.430	1.779	2.439
PC	33.071	72.839	129.487	198.067	244.675	302.126	358.155	468.792
PC/PF	70.163	154.806	274.701	402.611	517.880	639.108	759.108	992.152
RMF	0.436	0.962	1.706	2.501	3.217	3.970	4.715	6.163
CT	0.905	2.040	3.647	5.362	6.908	8.534	10.143	13.268
P6/PF	0.4507	0.4713	0.4914	0.5205	0.5320	0.5463	0.5563	0.6128
CPB	-0.0953	-0.0917	-0.0882	-0.0832	-0.0812	-0.0787	-0.0770	-0.0671
P1/PF	0.5419	0.5537	0.5884	0.6116	0.6231	0.6461	0.6476	0.7037
P2/PF	0.2829	0.3102	0.3414	0.3882	0.3997	0.4230	0.4356	0.5045
P3/PF	0.6364	0.6462	0.6473	0.6587	0.6702	0.6696	0.6711	0.7155
P4/PF	0.3417	0.3653	0.3885	0.4236	0.4350	0.4465	0.4710	0.5277
P5/PF	0.7561	0.7659	0.7650	0.7765	0.7641	0.7756	0.7653	0.7976
P6/PF	0.8483	0.8483	0.8474	0.8589	0.8583	0.8577	0.8474	0.8680
P7/PF	0.8366	0.8366	0.8356	0.8471	0.8465	0.8459	0.8356	0.8562
P8/PF	0.8130	0.8248	0.8239	0.8236	0.8230	0.8224	0.8239	0.8444
P9/PF	0.8249	0.8366	0.8356	0.8353	0.8347	0.8341	0.8356	0.8562
P10/PF	0.8248	0.8366	0.8356	0.8353	0.8347	0.8459	0.8356	0.8562
P11/PF	0.8248	0.8366	0.8356	0.8353	0.8347	0.8341	0.8356	0.8562
P12/PF	0.8719	0.8719	0.8827	0.8707	0.8815	0.8812	0.8710	0.8915
P13/PF	0.8601	0.8719	0.8710	0.8707	0.8701	0.8695	0.8710	0.8915
P14/PF	0.8954	0.8954	0.8945	0.8942	0.9051	0.9048	0.8945	0.9147
P15/PF	0.9664	0.9661	0.9652	0.9649	0.9757	0.9751	0.9534	0.9851
P16/PF	0.9899	0.9696	1.0005	0.9881	0.9993	0.9869	0.9887	1.0086
P17/PF	1.0135	1.0135	1.0123	1.0117	1.0228	1.0104	1.0123	1.0322

TC	64.237	68.403	71.520	74.653	76.042	72.223
FLO	3.118	3.795	4.399	5.047	5.715	6.340
PC	587.108	704.856	811.227	926.699	1040.464	1145.983
PC/PF	1244.434	1492.702	1716.379	1958.501	2196.692	2418.177
RMF	7.730	9.272	10.661	12.165	13.645	15.021
CT	16.650	19.979	22.979	26.225	29.419	32.389
P8/PF	0.6181	0.6609	0.6809	0.7261	0.7655	0.7883
CPB	-0.0662	-0.0588	-0.0540	-0.0475	-0.0407	-0.0367
P1/PF	0.7182	0.7756	0.8091	0.8432	0.8882	0.9111
P2/PF	0.5063	0.5639	0.5981	0.6442	0.7013	0.7357
P3/PF	0.7064	0.7285	0.7387	0.7496	0.7596	0.7707
P4/PF	0.5416	0.5757	0.6098	0.6675	0.7128	0.7357
P5/PF	0.7771	0.7988	0.7855	0.7846	0.7831	0.7943
P6/PF	0.8359	0.8459	0.8441	0.8432	0.8532	0.8526
P7/PF	0.8359	0.8459	0.8441	0.8432	0.8532	0.8526
P8/PF	0.8242	0.8341	0.8323	0.8314	0.8414	0.8408
P9/PF	0.8359	0.8459	0.8323	0.8314	0.8414	0.8408
P10/PF	0.8359	0.8459	0.8441	0.8432	0.8414	0.8526
P11/PF	0.8359	0.8459	0.8441	0.8432	0.8414	0.8526
P12/PF	0.8713	0.8812	0.8676	0.8667	0.8764	0.8758
P13/PF	0.8713	0.8695	0.8676	0.8667	0.8764	0.8758
P14/PF	0.8948	0.9048	0.9030	0.9018	0.9117	0.9111
P15/PF	0.9655	0.9633	0.9615	0.9603	0.9700	0.9694
P16/PF	0.9893	0.9869	0.9868	0.9839	0.9935	0.9926
P17/PF	1.0126	1.0222	0.9966	1.0071	1.0168	1.0162

16

Table IV. (Continued)

MJ = 2.70   THEJ = 20.00   DJ/DB = 0.450

MF = 1.500
PF = 2.099
RN/IN = .167

TC	71.528	64.931	61.112	57.639	56.251	54.514	53.473	52.084
FLO	----	----	0.360	0.964	1.515	2.017	2.449	3.320
PC	25.076	76.272	129.741	178.661	244.645	302.667	358.980	474.453
PC/PF	11.933	36.360	62.197	85.340	116.985	144.520	171.239	225.730
RMF	0.336	1.025	1.753	2.405	3.297	4.073	4.825	6.361
CT	0.610	2.121	3.720	5.152	7.111	8.814	10.468	13.840
PB/PF	0.4702	0.6445	0.7659	0.8533	0.9479	1.0227	1.0866	1.2026
CPB	-0.3364	-0.2257	-0.1486	-0.0931	-0.0331	0.0144	0.0550	0.1287
P1/PF	0.4100	0.6141	0.7533	0.8540	0.9638	1.0499	1.1204	1.2390
P2/PF	0.3888	0.5982	0.7400	0.8434	0.9532	1.0419	1.1124	1.2390
P3/PF	0.6719	0.7597	0.8305	0.8779	0.9293	0.9730	1.0197	1.1121
P4/PF	0.4100	0.6062	0.7400	0.8381	0.9452	1.0260	1.0939	1.2205
P5/PF	0.8411	0.8523	0.8544	0.8673	0.9080	0.9650	1.0118	1.1518
P6/PF	0.9443	0.9502	0.9503	0.9468	0.9479	0.9491	0.9482	0.9484
P7/PF	0.9284	0.9317	0.9263	0.9256	0.9240	0.9226	0.9217	0.9246
P8/PF	0.9152	0.9211	0.9183	0.9176	0.9187	0.9173	0.9164	0.9167
P9/PF	0.8861	0.8920	0.8891	0.8885	0.8895	0.8908	0.8899	0.8929
P10/PF	0.8861	0.8920	0.8917	0.8885	0.8895	0.8908	0.8899	0.8903
P11/PF	0.8676	0.8761	0.8757	0.8726	0.8735	0.8723	0.8714	0.8744
P12/PF	0.8993	0.9052	0.9024	0.8991	0.9027	0.9041	0.9032	0.9035
P13/PF	0.8729	0.8788	0.8784	0.8752	0.8788	0.8776	0.8767	0.8770
P14/PF	0.8914	0.8947	0.8944	0.8911	0.8921	0.8935	0.8899	0.8929
P15/PF	0.9469	0.9502	0.9503	0.9468	0.9505	0.9491	0.9482	0.9484
P16/PF	0.9734	0.9767	0.9795	0.9760	0.9771	0.9756	0.9747	0.9748
P17/PF	0.9998	1.0085	1.0088	1.0052	1.0063	1.0048	1.0038	1.0065

TC	52.431	53.820	57.987	62.848	67.709	70.139
FLO	4.161	5.013	5.855	6.641	7.491	8.229
PC	586.228	699.994	815.466	922.974	1037.309	1138.560
PC/PF	279.867	333.968	387.138	438.217	491.002	537.629
RMF	7.887	9.411	10.909	12.349	13.836	15.150
CT	17.190	20.538	23.828	26.989	30.255	33.140
PB/PF	1.2909	1.3537	1.3905	1.4203	1.4370	1.4466
CPB	0.1847	0.2246	0.2479	0.2668	0.2774	0.2836
P1/PF	1.3333	1.3961	1.4366	1.4658	1.4849	1.4918
P2/PF	1.3333	1.3987	1.4366	1.4684	1.4849	1.4945
P3/PF	1.1849	1.2398	1.2705	1.2970	1.3089	1.3162
P4/PF	1.3121	1.3802	1.4182	1.4499	1.4692	1.4840
P5/PF	1.2750	1.3537	1.4024	1.4368	1.4508	1.4604
P6/PF	0.9516	1.0040	1.1309	1.2628	1.3299	1.3765
P7/PF	0.9198	0.9192	0.9226	0.9332	0.9803	1.1091
P8/PF	0.9172	0.9166	0.9147	0.9174	0.9120	0.9150
P9/PF	0.8933	0.8928	0.8936	0.8963	0.8936	0.8940
P10/PF	0.8880	0.8928	0.8910	0.8963	0.8910	0.8967
P11/PF	0.8721	0.8769	0.8751	0.8779	0.8752	0.8783
P12/PF	0.9039	0.9060	0.9041	0.9069	0.9041	0.9045
P13/PF	0.8774	0.8795	0.8778	0.8805	0.8778	0.8783
P14/PF	0.8907	0.8928	0.8910	0.8937	0.8910	0.8914
P15/PF	0.9490	0.9513	0.9463	0.9517	0.9435	0.9491
P16/PF	0.9755	0.9775	0.9753	0.9780	0.9751	0.9780
P17/PF	1.0047	1.0067	1.0043	1.0097	1.0040	1.0068

Table IV. (Continued)

MJ = 2.7)   THEJ = 20.00   DJ/DB = 0.450

MF   = 2.500
PF   = .690
RN/IN = .167

TC	67.014	63.542	61.459	60.417	59.723	59.028	57.987	57.292
FLO	----	----	0.357	1.003	1.539	1.992	-2.445	3.246
PC	23.931	71.713	128.027	184.341	245.775	302.089	360.679	466.766
PC/PF	34.678	103.904	185.936	267.423	355.956	437.594	522.895	675.421
RMF	0.352	1.054	1.886	2.713	3.611	4.439	5.305	6.852
CT	0.726	2.268	4.096	5.911	7.883	9.702	11.602	15.000
PB/PF	0.5551	0.6556	0.7882	0.8940	0.9970	1.0836	1.1811	1.3335
CPB	-0.1017	-0.0787	-0.0484	-0.0242	-0.0007	0.0191	0.0414	0.0762
P1/PF	0.5792	0.6918	0.8466	0.9746	1.0935	1.1902	1.2958	1.4620
P2/PF	0.4586	0.5872	0.7579	0.8859	1.0130	1.1178	1.2314	1.3978
P3/PF	0.7079	0.7483	0.7983	0.8456	0.8926	0.9409	1.0060	1.1166
P4/PF	0.4746	0.5953	0.7499	0.8698	0.9889	1.0856	1.1912	1.3576
P5/PF	0.7803	0.7803	0.7902	0.8135	0.9006	0.9730	1.0383	1.1729
P6/PF	0.8528	0.8606	0.8546	0.8538	0.8522	0.8604	0.8611	0.8596
P7/PF	0.8608	0.8606	0.8546	0.8618	0.8603	0.8604	0.8611	0.8596
P8/PF	0.8447	0.8446	0.8466	0.8456	0.8442	0.8444	0.8451	0.8435
P9/PF	0.8528	0.8526	0.8466	0.8538	0.8522	0.8524	0.8531	0.8516
P10/PF	0.8528	0.8526	0.8466	0.8538	0.8522	0.8524	0.8531	0.8516
P11/PF	0.8447	0.8446	0.8386	0.8456	0.8442	0.8444	0.8451	0.8435
P12/PF	0.8769	0.8769	0.8789	0.8779	0.8763	0.8765	0.8774	0.8757
P13/PF	0.8608	0.8606	0.8627	0.8618	0.8603	0.8604	0.8611	0.8676
P14/PF	0.8929	0.8929	0.8950	0.8939	0.8926	0.8927	0.8934	0.8917
P15/PF	0.9573	0.9572	0.9595	0.9584	0.9568	0.9570	0.9578	0.9560
P16/PF	0.9814	0.9814	0.9836	0.9826	0.9809	0.9891	0.9819	0.9881
P17/PF	0.9975	1.0055	0.9999	1.0067	1.0050	1.0052	0.9980	1.0041

TC	56.945	58.334	62.153	65.973	71.876	76.389	75.695
FLO	3.132	4.105	4.968	5.765	6.561	7.455	8.220
PC	451.123	581.385	699.416	808.631	919.554	1039.576	1142.250
PC/PF	654.402	841.822	1013.622	1170.798	1329.365	1505.886	1645.026
RMF	6.639	8.540	10.283	11.877	13.486	15.277	16.688
CT	14.532	18.707	22.534	26.036	29.568	33.501	36.600
PB/PF	1.3187	1.4831	1.5951	1.6719	1.7175	1.7491	1.7707
CPB	0.0728	0.1104	0.1360	0.1536	0.1640	0.1712	0.1762
P1/PF	1.4415	1.6158	1.7217	1.8005	1.8379	1.8738	1.8866
P2/PF	1.3852	1.5594	1.6736	1.7523	1.8058	1.8335	1.8547
P3/PF	1.1032	1.2298	1.3195	1.3826	1.4205	1.4395	1.4549
P4/PF	1.3448	1.5273	1.6655	1.7523	1.8058	1.8497	1.8866
P5/PF	1.1596	1.3746	1.5447	1.6558	1.7094	1.7452	1.7667
P6/PF	0.8536	0.8601	0.8610	0.9003	1.0595	1.3108	1.4790
P7/PF	0.8616	0.8601	0.8610	0.8601	0.8587	0.8604	0.8714
P8/PF	0.8456	0.8440	0.8447	0.8440	0.8427	0.8444	0.8475
P9/PF	0.8536	0.8601	0.8610	0.8601	0.8668	0.8685	0.8634
P10/PF	0.8536	0.8521	0.8447	0.8521	0.8507	0.8524	0.8634
P11/PF	0.8456	0.8440	0.8447	0.8440	0.8427	0.8444	0.8394
P12/PF	0.8779	0.8762	0.8770	0.8762	0.8748	0.8765	0.8714
P13/PF	0.8616	0.8601	0.8610	0.8681	0.8668	0.8604	0.8634
P14/PF	0.8939	0.8922	0.8931	0.8922	0.8909	0.8927	0.8953
P15/PF	0.9584	0.9566	0.9575	0.9565	0.9551	0.9570	0.9513
P16/PF	0.9824	0.9807	0.9816	0.9807	0.9792	0.9811	0.9833
P17/PF	0.9987	0.9968	0.9976	0.9968	0.9953	0.9971	0.9913

18

Table IV. (Continued)

MJ = 2.70   THEJ = 0.   DJ/DB = 0.800

MF   = 1.500
PF   = 2.160
RN/IN = .167

TC	57.639	53.126	47.917	43.751	40.278	38.889	39.237	40.973
FLO	----	0.685	1.480	2.916	4.415	5.757	7.239	8.565
PC	26.120	44.322	70.488	125.474	186.149	241.136	299.915	355.281
PC/PF	12.455	21.108	34.305	61.427	90.328	112.478	134.086	155.190
RMF	1.109	1.880	3.055	5.471	8.045	10.017	11.942	13.821
CT	2.030	3.722	6.303	11.607	17.260	21.592	25.818	29.945
PB/PF	0.3070	0.3776	0.4444	0.5415	0.6312	0.6890	0.7483	0.8027
CPB	-0.4400	-0.3952	-0.3528	-0.2911	-0.2342	-0.1974	-0.1598	-0.1253
P3/PF	0.3289	0.3960	0.4614	0.5559	0.6446	0.7019	0.7590	0.8115
P4/PF	0.2973	0.3724	0.4399	0.5397	0.6312	0.6916	0.7541	0.8091
P5/PF	0.2947	0.3645	0.4319	0.5289	0.6178	0.6736	0.7319	0.7874
P6/PF	0.9262	0.9335	0.9389	0.9364	0.9361	0.9281	0.9241	0.9271
P7/PF	0.9788	0.9859	0.9845	0.9741	0.9709	0.9590	0.9586	0.9608
P8/PF	0.9736	0.9807	0.9818	0.9741	0.9709	0.9590	0.9635	0.9680
P9/PF	0.9657	0.9728	0.9791	0.9714	0.9709	0.9590	0.9635	0.9680
P10/PF	1.0130	1.0174	1.0247	1.0173	1.0164	1.0027	1.0054	1.0114
P11/PF	0.9920	1.0016	1.0086	1.0011	0.9976	0.9873	0.9931	0.9993
P12/PF	1.0288	1.0331	1.0408	1.0281	1.0270	1.0104	1.0153	1.0234
P13/PF	0.3131	0.3828	0.4560	0.5586	0.6446	0.6993	0.7541	0.8115
P14/PF	0.3026	0.3750	0.4533	0.5613	0.6553	0.7225	0.7837	0.8548
P15/PF	0.3079	0.3802	0.4614	0.5667	0.6580	0.7147	0.7762	0.8380

TC	45.139	52.084	55.903
FLO	9.901	11.183	1.727
PC	411.784	466.770	500.899
PC/PF	179.279	206.691	229.693
RMF	15.967	18.408	20.457
CT	34.656	40.017	44.516
PB/PF	0.8584	0.9187	0.9706
CPB	-0.0899	-0.0517	-0.0187
P3/PF	0.8664	0.9276	0.9781
P4/PF	0.8640	0.9252	0.9781
P5/PF	0.8448	0.9032	0.9554
P6/PF	0.9312	0.9398	0.9504
P7/PF	0.9624	0.9667	0.9731
P8/PF	0.9744	0.9789	0.9832
P9/PF	0.9744	0.9789	0.9832
P10/PF	1.0200	1.0228	1.0287
P11/PF	1.0080	1.0179	1.0363
P12/PF	1.0272	1.0326	1.0414
P13/PF	0.8688	0.9325	0.9908
P14/PF	0.9192	0.9935	1.0591
P15/PF	0.8952	0.9594	1.0186

Table IV. (Continued)

MJ = 2.70   THEJ = 0.   DJ/DB = 0.800

MF   = 2.500
PF   = .689
RN/IN = .167

TC	58.334	55.556	51.737	49.306	46.528	45.834	46.876	49.306
FLO	----	----	0.525	1.541	2.978	4.423	5.749	7.108
PC	15.886	26.125	42.052	74.286	128.514	186.534	241.900	298.024
PC/PF	23.038	37.817	60.922	107.646	185.941	269.475	350.550	430.817
RMF	0.739	1.212	1.953	3.451	5.962	8.640	11.239	13.813
CT	1.476	2.516	4.143	7.433	12.945	18.827	24.535	30.186
PB/PF	0.3732	0.3288	0.4505	0.5083	0.5508	0.6336	0.6796	0.7579
CPB	-0.1433	-0.1534	-0.1256	-0.1124	-0.1027	-0.0837	-0.0732	-0.0553
P3/PF	0.4685	0.4251	0.5406	0.5956	0.6306	0.7079	0.7516	0.8268
P4/PF	0.3255	0.2807	0.4054	0.4687	0.5109	0.5965	0.6476	0.7234
P5/PF	0.3255	0.2807	0.4054	0.4606	0.5109	0.5965	0.6397	0.7234
P6/PF	0.9766	0.8982	0.9698	0.9689	0.9339	0.9464	0.9355	0.9649
P7/PF	1.0241	0.9464	1.0096	1.0086	0.9739	0.9862	0.9754	0.9937
P8/PF	1.0322	0.9542	1.0175	1.0245	0.9898	1.0021	0.9835	1.0016
P9/PF	1.0241	0.9384	1.0096	1.0166	0.9819	0.9941	0.9835	1.0016
P10/PF	1.0481	0.9623	1.0334	1.0404	1.0058	1.0258	1.0074	1.0255
P11/PF	1.0241	0.9303	1.0096	1.0086	0.9739	0.9862	0.9754	0.9937
P12/PF	1.0322	0.9384	1.0175	1.0166	0.9819	0.9941	0.9835	1.0016
P13/PF	0.3335	0.2807	0.4133	0.4687	0.5109	0.5965	0.6636	0.7472
P14/PF	0.3176	0.2647	0.3974	0.4606	0.5109	0.6045	0.6716	0.7631
P15/PF	0.3255	0.2807	0.4054	0.4687	0.5109	0.5965	0.6556	0.7393

TC	53.473	60.073	65.278	62.848
FLO	8.404	9.685	10.999	1.687
PC	353.769	407.618	466.777	491.426
PC/PF	511.762	588.829	672.589	727.186
RMF	16.408	18.879	21.565	23.315
CT	35.885	41.311	47.209	51.053
PB/PF	0.8071	0.8432	0.9315	0.9603
CPB	-0.0441	-0.0358	-0.0157	-0.0091
P3/PF	0.8681	0.9097	0.9894	1.0173
P4/PF	0.7805	0.8140	0.9025	0.9360
P5/PF	0.7726	0.8059	0.9025	0.9278
P6/PF	0.9478	0.9336	0.9657	0.9847
P7/PF	0.9876	0.9736	0.9975	1.0173
P8/PF	0.9956	0.9736	1.0132	1.0255
P9/PF	0.9956	0.9736	1.0053	1.0173
P10/PF	1.0195	0.9975	1.0291	1.0417
P11/PF	0.9876	0.9655	0.9975	1.0173
P12/PF	0.9956	0.9736	1.0132	1.0173
P13/PF	0.8124	0.8459	0.9419	0.9929
P14/PF	0.8203	0.8538	0.9500	0.9929
P15/PF	0.7965	0.8299	0.9182	0.9522

20

Table IV. (Continued)

MJ = 2.73   THEJ = 20.00   DJ/DB = 0.800

MF   = 1.500
PF   = 2.163
RN/IN = .167

TC	57.723	53.209	50.084	47.306	45.917	46.959	49.042	53.209
FLO	----	0.601	1.349	2.774	4.316	5.731	7.053	8.455
PC	25.038	43.241	67.890	121.739	185.448	243.468	297.317	356.475
PC/PF	11.089	20.519	32.420	57.681	87.397	114.822	134.633	157.878
RMF	1.059	1.827	2.887	5.137	7.784	10.226	11.991	14.061
CT	1.919	3.607	5.934	10.875	16.686	22.050	25.924	30.471
PB/PF	0.5441	0.6561	0.8301	1.0951	1.3157	1.4390	1.5023	1.5498
CPB	-0.2894	-0.2183	-0.1078	0.0604	0.2005	0.2788	0.3189	0.3490
P3/PF	0.5565	0.6649	0.8434	1.1065	1.3244	1.4521	1.5115	1.5588
P4/PF	0.5380	0.6517	0.8275	1.0959	1.3192	1.6417	1.5065	1.5514
P5/PF	0.5380	0.6517	0.8195	1.0828	1.3035	1.4233	1.4889	1.5391
P6/PF	0.8835	0.8865	0.8938	1.0064	1.2093	1.3736	1.4512	1.5046
P7/PF	0.9679	0.9710	0.9734	0.9748	0.9789	0.9733	0.9834	1.0392
P8/PF	0.9626	0.9683	0.9681	0.9660	0.9685	0.9602	0.9658	0.9693
P9/PF	0.9784	0.9842	0.9840	0.9827	0.9842	0.9733	0.9758	0.9776
P10/PF	0.9705	0.9762	0.9760	0.9748	0.9763	0.9628	0.9683	0.9703
P11/PF	0.9257	0.9314	0.9336	1.0143	1.1857	1.3553	1.4034	1.4357
P12/PF	1.0364	1.0422	1.0423	1.0406	1.0418	1.0309	1.0362	1.0564
P13/PF	0.5459	0.6411	0.8301	1.1065	1.3087	1.4312	1.4864	1.5317
P14/PF	0.5301	0.6306	0.8301	1.1117	1.3087	1.4024	1.4235	1.4430
P15/PF	0.5406	0.6411	0.8407	1.1223	1.3297	1.4312	1.4537	1.4874

TC	57.723	61.542	60.848
FLO	9.752	10.944	11.452
PC	411.842	463.036	489.961
PC/PF	181.638	207.172	225.400
RMF	16.177	18.451	20.074
CT	35.117	40.111	43.676
PB/PF	1.5873	1.6153	1.6280
CPB	0.3729	0.3906	0.3987
P3/PF	1.5947	1.6227	1.6348
P4/PF	1.5873	1.6153	1.6246
P5/PF	1.5799	1.6078	1.6246
P6/PF	1.5481	1.5780	1.5914
P7/PF	1.2296	1.3667	1.4407
P8/PF	0.9749	0.9816	0.9885
P9/PF	0.9872	0.9890	0.9962
P10/PF	0.9798	0.9841	0.9885
P11/PF	1.4648	1.4910	1.5045
P12/PF	1.1317	1.2425	1.3129
P13/PF	1.5726	1.6053	1.6246
P14/PF	1.4697	1.4910	1.5071
P15/PF	1.5236	1.5531	1.5709

Table IV. (Continued)

MJ = 2.70   THEJ = 20.00   DJ/DB = 0.800

MF = 2.000
PF = 1.178
RN/IN = .167

TC	61.889	56.681	53.556	51.126	49.389	49.389	51.473	54.251
FLO	----	----	0.659	1.473	3.063	4.291	5.608	6.992
PC	15.938	25.039	46.275	71.304	133.116	183.172	238.918	296.559
PC/PF	13.488	21.390	39.601	60.812	112.593	155.703	203.226	252.123
RMF	0.676	1.072	1.984	3.047	5.641	7.800	10.181	12.631
CT	1.255	2.125	4.128	6.461	12.158	16.900	22.129	27.508
PB/PF	0.5170	0.6484	0.7398	0.8819	1.1959	1.3988	1.5684	1.6968
CPB	-0.1725	-0.1256	-0.0929	-0.0422	0.0700	0.1424	0.2030	0.2489
P3/PF	0.5545	0.6832	0.7698	0.9104	1.2256	1.4255	1.5936	1.7204
P4/PF	0.4982	0.6310	0.7271	0.8677	1.1881	1.3973	1.5653	1.6920
P5/PF	0.4982	0.6310	0.7224	0.8677	1.1739	1.3737	1.5463	1.6779
P6/PF	0.9164	0.9203	0.9220	0.9293	1.0471	1.1707	1.3572	1.5644
P7/PF	0.9963	0.9963	0.9932	0.9957	1.0002	1.0054	1.0072	1.0067
P8/PF	0.9916	0.9963	0.9885	0.9910	0.9908	0.9961	0.9931	0.9925
P9/PF	1.0010	1.0058	1.0028	1.0052	1.0002	1.0054	1.0072	1.0067
P10/PF	0.9916	0.9963	0.9885	0.9910	0.9861	0.9913	0.9883	0.9878
P11/PF	0.9446	0.9441	0.9362	0.9436	1.0378	1.1471	1.2816	1.4794
P12/PF	1.0433	1.0437	1.0360	1.0384	1.0378	1.0432	1.0451	1.0398
P13/PF	0.5170	0.6547	0.7271	0.9341	1.2162	1.4303	1.5889	1.6779
P14/PF	0.5076	0.6404	0.7176	0.8961	1.1834	1.3973	1.5463	1.6023
P15/PF	0.5076	0.6452	0.7271	0.8961	1.2115	1.4208	1.6125	1.6873

TC	57.723	60.501	58.417
FLO	8.431	9.700	10.967
PC	356.855	410.704	462.277
PC/PF	302.063	346.472	388.671
RMF	15.132	17.357	19.471
CT	33.002	37.887	42.529
PB/PF	1.7941	1.8429	1.8749
CPB	0.2836	0.3011	0.3125
P3/PF	1.8191	1.8648	1.8951
P4/PF	1.7862	1.8367	1.8671
P5/PF	1.7769	1.8273	1.8625
P6/PF	1.6922	1.7524	1.7970
P7/PF	1.0059	1.0074	1.0316
P8/PF	0.9918	0.9886	0.9943
P9/PF	1.0059	1.0027	1.0036
P10/PF	0.9918	0.9839	0.9896
P11/PF	1.6264	1.6258	1.6244
P12/PF	1.0435	1.0402	1.0456
P13/PF	1.7392	1.7805	1.8204
P14/PF	1.6170	1.6211	1.6384
P15/PF	1.7251	1.7430	1.7784

Table IV. (Continued)

MJ = 2.70   THEJ = 20.00   DJ/DB = 0.800

MF   = 2.500
PF   = .693
RN/IN   .167

TC	54.945	52.167	50.084	47.306	46.264	46.612	48.348	51.126
FLO	----	0.586	1.340	2.859	4.343	5.746	7.068	8.409
PC	25.038	44.378	66.752	124.394	184.310	241.572	296.938	354.200
PC/PF	36.290	64.504	96.836	179.620	265.499	350.013	429.121	510.674
RMF	1.164	2.068	3.105	5.759	8.512	11.222	13.758	16.373
CT	2.409	4.395	6.672	12.500	18.547	24.497	30.067	35.809
PB/PF	0.7677	0.8291	0.9295	1.2408	1.5258	1.7609	1.9483	2.0665
CPB	-0.0531	-0.0391	-0.0161	0.0550	0.1202	0.1739	0.2168	0.2438
P3/PF	0.8374	0.8963	0.9913	1.2915	1.5765	1.8171	1.9991	2.1065
P4/PF	0.7328	0.7995	0.9027	1.2194	1.5124	1.7448	1.9270	2.0425
P5/PF	0.7328	0.7914	0.8946	1.2114	1.4885	1.7207	1.9189	2.0505
P6/PF	0.9261	0.9286	0.9269	1.0749	1.2404	1.4393	1.7101	1.8982
P7/PF	1.0226	1.0255	1.0236	1.0269	1.0323	1.0373	1.0598	1.0573
P8/PF	0.9905	0.9852	0.9833	0.9787	0.9843	0.9809	0.9876	0.9852
P9/PF	0.9905	0.9932	0.9913	0.9867	0.9924	0.9889	0.9956	0.9932
P10/PF	0.9744	0.9689	0.9671	0.9707	0.9683	0.9648	0.9715	0.9613
P11/PF	0.9180	0.9206	0.9187	1.0590	1.2085	1.3267	1.4853	1.7781
P12/PF	1.0146	1.0175	1.0154	1.0108	1.0163	1.0212	1.0197	1.0253
P13/PF	0.7489	0.7832	0.9269	1.2353	1.4966	1.7127	1.8226	1.8824
P14/PF	0.7328	0.7591	0.9187	1.2034	1.4485	1.6724	1.7583	1.7542
P15/PF	0.7408	0.7672	0.9187	1.2275	1.4725	1.7047	1.8627	1.9623

TC	55.639	44.181	57.028	50.778	49.389	53.556
FLO	9.721	9.854	10.912	11.138	1.676	11.710
PC	409.566	411.082	464.173	466.069	491.098	500.578
PC/PF	588.464	591.299	664.247	668.320	703.596	726.057
RMF	18.867	18.958	21.297	21.428	22.559	23.279
CT	41.286	41.485	46.621	46.908	49.392	50.973
PB/PF	2.1472	2.1525	2.1942	2.2072	2.2228	2.2673
CPB	0.2622	0.2634	0.2730	0.2759	0.2795	0.2897
P3/PF	2.1872	2.1899	2.2340	2.2444	2.2627	2.2888
P4/PF	2.1233	2.1339	2.1704	2.1807	2.1909	2.2485
P5/PF	2.1313	2.1339	2.1783	2.1966	2.2148	2.2646
P6/PF	1.9956	1.9980	2.0590	2.0693	2.0874	2.1438
P7/PF	1.0776	1.0790	1.1130	1.0983	1.1154	1.1121
P8/PF	0.9818	0.9833	0.9859	0.9869	0.9879	1.0074
P9/PF	0.9898	0.9910	0.9859	0.9949	0.9959	1.0154
P10/PF	0.9659	0.9590	0.9619	0.9710	0.9640	0.9913
P11/PF	1.8120	1.8062	1.7728	1.7747	1.7768	1.8133
P12/PF	1.0217	1.0229	1.0255	1.0187	1.0199	1.0477
P13/PF	1.9237	1.9261	1.9558	1.9498	1.9680	1.9987
P14/PF	1.7720	1.7742	1.7887	1.7908	1.8005	1.8294
P15/PF	1.9956	2.0300	2.0353	2.0454	2.0476	2.0874

Table IV. (Continued)

MJ = 2.70　　THEJ = 20.00　　DJ/DB = 0.800

MF　　= 2.870
PF　　= .472
RN/IN = .167

TC	56.681	53.903	52.167	50.778	48.695	49.042	51.473	54.251
FLO	----	----	0.491	1.407	2.983	*4.281	5.681	7.036
PC	15.558	25.038	42.103	69.028	129.703	184.310	241.193	297.317
PC/PF	33.013	53.125	89.220	146.833	275.025	389.808	509.122	627.379
RMF	0.803	1.292	2.171	3.572	6.691	9.483	12.386	15.263
CT	1.653	2.727	4.655	7.733	14.582	20.714	27.088	33.406
PB/PF	0.7307	0.8673	0.9377	1.0161	1.3232	1.6034	1.8761	2.1098
CPB	-0.0467	-0.0230	-0.0108	0.0028	0.0561	0.1046	0.1519	0.1925
P3/PF	0.8604	0.9890	1.0476	1.1224	1.4135	1.6819	1.9581	2.1803
P4/PF	0.6717	0.8124	0.8827	0.9688	1.2840	1.5759	1.8410	2.0746
P5/PF	0.6599	0.8006	0.8827	0.9570	1.2722	1.5523	1.8292	2.0746
P6/PF	0.9310	0.9301	0.9298	0.9452	1.1424	1.2818	1.4893	1.7700
P7/PF	1.0020	1.0008	1.0005	1.0044	1.0129	0.9996	1.0201	1.0198
P8/PF	0.9902	0.9890	0.9887	0.9926	0.9893	0.9760	0.9848	0.9730
P9/PF	1.0020	1.0008	1.0005	0.9926	0.9893	0.9878	0.9848	0.9845
P10/PF	0.9784	0.9772	0.9652	0.9688	0.9658	0.9528	0.9615	0.9612
P11/PF	0.8957	0.8948	0.8945	0.9099	1.1188	1.2701	1.4071	1.6293
P12/PF	0.9902	0.9890	0.9887	0.9926	1.0011	0.9878	0.9966	0.9963
P13/PF	0.6599	0.8124	0.8356	0.9452	1.2251	1.4585	1.7117	1.9107
P14/PF	0.6717	0.8124	0.8239	0.9688	1.2369	1.4820	1.7471	1.9107
P15/PF	0.6717	0.8124	0.8356	0.9688	1.2486	1.5056	1.7471	1.9339

TC	58.417	60.848	59.806
FLO	8.368	9.730	11.151
PC	353.821	411.462	468.723
PC/PF	745.560	865.258	995.788
RMF	18.138	21.050	24.226
CT	39.719	46.114	53.087
PB/PF	2.2799	2.3872	2.4629
CPB	0.2220	0.2406	0.2537
P3/PF	2.3500	2.4417	2.5021
P4/PF	2.2449	2.3599	2.4315
P5/PF	2.2449	2.3599	2.4550
P6/PF	2.0345	2.1845	2.2896
P7/PF	1.0289	1.0165	1.0624
P8/PF	0.9821	0.9815	0.9914
P9/PF	0.9938	0.9929	0.9914
P10/PF	0.9703	0.9579	0.9679
P11/PF	1.8708	1.9276	1.9593
P12/PF	1.0056	1.0047	1.0150
P13/PF	2.0227	2.0680	2.1244
P14/PF	1.9527	1.9862	2.0182
P15/PF	2.0345	2.0912	2.1480

24

Table IV. (Continued)

MJ = 2.70   THEJ = 20.00   DJ/DB = 0.300

MF   = 1.500
PF   = 2.099
RN/IN =   .167

TC	72.306	66.056	61.889	60.848	61.195	61.889	62.584	63.278
FLO	0.387	0.449	0.767	1.082	1.430	1.840	2.164	2.602
PC	69.399	125.144	243.915	344.712	460.752	582.482	683.733	814.563
PC/PF	33.137	59.825	116.414	164.909	220.004	277.427	325.271	386.814
RMF	0.415	0.749	1.458	2.065	2.755	3.475	4.074	4.845
CT	0.854	1.588	3.145	4.478	5.994	7.573	8.889	10.581
PB/PF	0.3085	0.3742	0.4959	0.5631	0.6274	0.6877	0.7371	0.7980
CPB	-0.4390	-0.3973	-0.3201	-0.2774	-0.2365	-0.1983	-0.1669	-0.1282
P1/PF	0.3239	0.3939	0.5129	0.5807	0.6434	0.7046	0.7541	0.8134
P2/PF	0.3054	0.3700	0.4969	0.5647	0.6301	0.6887	0.7409	0.8081
P3/PF	0.3027	0.3673	0.4890	0.5567	0.6221	0.6834	0.7329	0.7949
P4/PF	0.3054	0.3700	0.4890	0.5567	0.6194	0.6808	0.7276	0.7870
P5/PF	0.3054	0.3700	0.4916	0.5567	0.6221	0.6808	0.7303	0.7870
P6/PF	0.9108	0.9103	0.9088	0.9083	0.9066	0.9086	0.9102	0.9111
P7/PF	0.9665	0.9636	0.9646	0.9643	0.9651	0.9669	0.9684	0.9665
P8/PF	0.9772	0.9769	0.9779	0.9776	0.9757	0.9775	0.9790	0.9771
P9/PF	0.9825	0.9822	0.9806	0.9829	0.9810	0.9801	0.9843	0.9850
P10/PF	0.9825	0.9822	0.9806	0.9802	0.9810	0.9801	0.9816	0.9824
P11/PF	0.9718	0.9715	0.9700	0.9722	0.9704	0.9695	0.9710	0.9718
P12/PF	1.0356	1.0354	1.0337	1.0362	1.0342	1.0331	1.0372	1.0352
P13/PF	0.3133	0.3806	0.4996	0.5674	0.6275	0.6861	0.7329	0.7896
P14/PF	0.3107	0.3780	0.5023	0.5727	0.6327	0.6940	0.7329	0.7896
P15/PF	0.3133	0.3753	0.5076	0.5754	0.6354	0.6940	0.7382	0.7949

TC	63.626	63.278	63.278
FLO	2.937	3.125	3.348
PC	919.455	977.249	1039.592
PC/PF	436.860	463.777	493.674
RMF	5.471	5.808	6.183
CT	11.958	12.698	13.520
PB/PF	0.8457	0.8712	0.8854
CPB	-0.0979	-0.0818	-0.0728
P1/PF	0.8616	0.8870	0.9044
P2/PF	0.8563	0.8817	0.8965
P3/PF	0.8457	0.8711	0.8859
P4/PF	0.8325	0.8580	0.8700
P5/PF	0.8325	0.8580	0.8700
P6/PF	0.9145	0.9187	0.9176
P7/PF	0.9673	0.9688	0.9652
P8/PF	0.9779	0.9794	0.9758
P9/PF	0.9832	0.9846	0.9811
P10/PF	0.9832	0.9846	0.9811
P11/PF	0.9726	0.9741	0.9705
P12/PF	1.0360	1.0375	1.0340
P13/PF	0.8325	0.8553	0.8700
P14/PF	0.8378	0.8606	0.8780
P15/PF	0.8378	0.8580	0.8780

Table IV. (Continued)

MJ = 2.70   THEJ = 20.00   DJ/DB = 0.300

MF   = 2.500
PF   = .691
RN/IM = .167

TC	56.681	52.514	49.737	49.389	50.431	52.167	53.903	54.945
FLO	0.078	0.389	0.776	1.096	1.518	1.816	2.258	2.586
PC	75.089	131.972	242.098	348.127	476.682	567.922	703.303	807.968
PC/PF	108.738	191.429	350.672	503.867	689.892	821.217	1016.083	1168.805
RMF	0.490	0.863	1.581	2.272	3.111	3.703	4.581	5.270
CT	1.056	1.875	3.451	4.968	6.810	8.110	10.040	11.552
PB/PF	0.3336	0.3794	0.4804	0.5621	0.6555	0.7194	0.8175	0.8710
CPB	-0.1523	-0.1419	-0.1188	-0.1001	-0.0787	-0.0641	-0.0417	-0.0295
P1/PF	0.4029	0.4439	0.5399	0.6200	0.7087	0.7644	0.8512	0.9097
P2/PF	0.3222	0.3632	0.4755	0.5556	0.6523	0.7162	0.8111	0.8613
P3/PF	0.3142	0.3632	0.4675	0.5556	0.6523	0.7162	0.8271	0.8775
P4/PF	0.3142	0.3632	0.4594	0.5556	0.6361	0.7000	0.8111	0.8613
P5/PF	0.3142	0.3632	0.4594	0.5396	0.6281	0.7000	0.7870	0.8452
P6/PF	0.9428	0.9443	0.9430	0.9423	0.9421	0.9414	0.9556	0.9500
P7/PF	0.9830	0.9847	0.9833	0.9824	0.9824	0.9818	0.9877	0.9821
P8/PF	1.0072	1.0007	1.0074	1.0067	0.9985	1.0058	1.0038	0.9982
P9/PF	0.9912	0.9927	0.9913	0.9987	0.9905	0.9898	0.9958	0.9901
P10/PF	0.9912	0.9927	0.9913	0.9905	0.9905	0.9898	0.9958	0.9901
P11/PF	0.9589	0.9604	0.9590	0.9584	0.9584	0.9575	0.9636	0.9580
P12/PF	1.0072	1.0089	1.0074	1.0067	1.0065	1.0058	1.0118	1.0062
P13/PF	0.3222	0.3713	0.4755	0.5556	0.6523	0.7162	0.8111	0.8613
P14/PF	0.3142	0.3632	0.4594	0.5476	0.6361	0.7000	0.7870	0.8452
P15/PF	0.3142	0.3632	0.4675	0.5476	0.6361	0.7080	0.7950	0.8613

TC	57.376	58.070	61.889
FLO	2.994	3.118	3.299
PC	931.289	969.970	1030.266
PC/PF	1345.699	1398.388	1484.707
RMF	6.067	6.305	6.694
CT	13.303	13.825	14.679
PB/PF	0.9456	0.9505	0.9821
CPB	-0.0124	-0.0113	-0.0041
P1/PF	0.9811	1.0017	1.0253
P2/PF	0.9408	0.9457	0.9853
P3/PF	0.9568	0.9457	0.9853
P4/PF	0.9327	0.9296	0.9613
P5/PF	0.9167	0.9296	0.9532
P6/PF	0.9488	0.9616	0.9613
P7/PF	0.9811	0.9857	0.9853
P8/PF	0.9971	1.0098	1.0012
P9/PF	0.9891	1.0017	0.9934
P10/PF	0.9891	0.9937	0.9934
P11/PF	0.9650	0.9777	0.9773
P12/PF	1.0052	1.0098	1.0012
P13/PF	0.9327	0.9536	0.9693
P14/PF	0.9167	0.9457	0.9613
P15/PF	0.9247	0.9536	0.9773

Table IV. (Continued)

MJ = 2.70   THEJ = 10.00   DJ/DB = 0.800

MF   = 1.500
PF   = 2.111
RN/IN = .167

TC	70.098	66.973	63.848	61.417	60.028	58.987	57.945	57.945
FLO	0.348	0.602	0.849	1.351	1.927	2.431	3.089	3.525
PC	19.358	25.047	37.560	59.176	82.308	103.545	131.607	150.188
PC/PF	9.228	11.976	17.964	28.200	39.262	49.343	62.581	71.726
RMF	0.822	1.067	1.600	2.511	3.497	4.395	5.574	6.388
CT	1.398	1.936	3.107	5.109	7.272	9.244	11.833	13.621
PB/PF	0.3349	0.3664	0.4432	0.5414	0.6189	0.6810	0.7482	0.7984
CPB	-0.4223	-0.4023	-0.3535	-0.2912	-0.2420	-0.2026	-0.1599	-0.1280
P3/PF	0.3605	0.3912	0.4654	0.5617	0.6366	0.6969	0.7623	0.8143
P4/PF	0.3234	0.3540	0.4335	0.5326	0.6100	0.6757	0.7438	0.7957
P5/PF	0.3207	0.3540	0.4308	0.5299	0.6100	0.6704	0.7385	0.7851
P6/PF	0.9092	0.9076	0.9095	0.9115	0.9124	0.9141	0.9158	0.9204
P7/PF	0.9622	0.9608	0.9600	0.9618	0.9654	0.9645	0.9635	0.9655
P8/PF	0.9701	0.9688	0.9680	0.9698	0.9707	0.9698	0.9714	0.9734
P9/PF	0.9860	0.9848	0.9839	0.9830	0.9867	0.9830	0.9846	0.9867
P10/PF	0.9569	0.9555	0.9520	0.9539	0.9575	0.9565	0.9555	0.9576
P11/PF	0.7846	0.7851	0.7898	0.8029	0.8169	0.8294	0.8549	0.8727
P12/PF	1.0284	1.0273	1.0265	1.0254	1.0291	1.0254	1.0270	1.0291
P13/PF	0.3366	0.3699	0.4494	0.5564	0.6445	0.6995	0.7782	0.8196
P14/PF	0.3287	0.3646	0.4547	0.5723	0.6657	0.7260	0.8073	0.8541
P15/PF	0.3207	0.3540	0.4361	0.5432	0.6366	0.6942	0.7755	0.8196

TC	57.945	57.945	59.334	60.376	60.028	55.862	54.820
FLO	4.178	4.572	5.788	7.037	8.418	9.691	11.340
PC	177.492	194.557	245.752	298.084	356.104	408.057	482.385
PC/PF	84.605	92.824	116.512	141.197	167.048	191.709	216.894
RMF	7.535	8.267	10.377	12.575	14.878	17.074	19.317
CT	16.140	17.748	22.381	27.208	32.264	37.087	42.013
PB/PF	0.8508	0.8878	0.9795	1.0632	1.1429	1.2151	1.2749
CPB	-0.0947	-0.0712	-0.0130	0.0401	0.0907	0.1366	0.1746
P3/PF	0.8650	0.9019	0.9927	1.0746	1.1516	1.2212	1.2766
P4/PF	0.8464	0.8860	0.9769	1.0640	1.1437	1.2186	1.2791
P5/PF	0.8411	0.8754	0.9690	1.0509	1.1334	1.2055	1.2691
P6/PF	0.9207	0.9311	0.9506	0.9850	1.0317	1.0933	1.1540
P7/PF	0.9632	0.9656	0.9638	0.9666	0.9666	0.9707	0.9712
P8/PF	0.9711	0.9736	0.9716	0.9692	0.9692	0.9733	0.9762
P9/PF	0.9844	0.9868	0.9848	0.9824	0.9822	0.9889	0.9888
P10/PF	0.9526	0.9577	0.9559	0.9508	0.9562	0.9628	0.9612
P11/PF	0.9128	0.9471	1.0243	1.1009	1.1750	1.2551	1.3267
P12/PF	1.0268	1.0293	1.0269	1.0245	1.0265	1.0333	1.0363
P13/PF	0.8729	0.9179	1.0111	1.0957	1.1750	1.2551	1.3267
P14/PF	0.9101	0.9550	1.0559	1.1483	1.2324	1.3073	1.3742
P15/PF	0.8729	0.9179	1.0085	1.0957	1.1776	1.2525	1.3267

Table IV. (Continued)

MJ = 2.70   THEJ = 10.00   DJ/DB = 0.800

N = 2.500
PF = .690
RN/IN = .167

TC	60.376	58.639	56.556	55.514	53.778	53.084	52.737	52.389
FLO	0.359	0.505	0.871	1.418	2.054	2.435	3.005	3.547
PC	19.356	25.044	38.696	61.449	87.616	103.543	127.434	150.187
PC/PF	28.092	36.348	56.103	89.155	127.066	150.157	184.715	237.491
RHF	0.901	1.165	1.799	2.858	4.074	4.814	5.922	6.973
CT	1.832	2.413	3.804	6.131	8.800	10.426	12.859	15.167
P3/PF	0.4631	0.4788	0.5159	0.5674	0.6262	0.6685	0.7066	0.7542
CPB	-0.1216	-0.1191	-0.1107	-0.0989	-0.0854	-0.0758	-0.0671	-0.0562
P3/PF	0.5811	0.5891	0.6288	0.6696	0.7256	0.7651	0.7979	0.8454
P4/PF	0.4116	0.4277	0.4594	0.5163	0.5806	0.6202	0.6609	0.7086
P5/PF	0.4116	0.4196	0.4594	0.5163	0.5724	0.6202	0.6609	0.7086
P6/PF	0.9281	0.9281	0.9331	0.9358	0.9353	0.9423	0.9349	0.9341
P7/PF	0.9765	0.9765	0.9754	0.9761	0.9756	0.9826	0.9753	0.9742
P8/PF	0.9925	0.9845	0.9915	0.9922	0.9917	0.9906	0.9833	0.9823
P9/PF	0.9925	0.9845	0.9915	0.9922	0.9917	0.9906	0.9833	0.9823
P10/PF	0.9522	0.9522	0.9512	0.9519	0.9513	0.9505	0.9510	0.9501
P11/PF	0.7747	0.7747	0.7820	0.7906	0.7983	0.8054	0.8140	0.8294
P12/PF	0.9845	0.9845	0.9835	0.9922	0.9917	0.9906	0.9913	0.9823
P13/PF	0.4277	0.4439	0.4676	0.5324	0.6047	0.6443	0.6932	0.7569
P14/PF	0.4116	0.4196	0.4594	0.5244	0.5886	0.6282	0.6850	0.7326
P15/PF	0.3954	0.4036	0.4353	0.5001	0.5643	0.5960	0.6448	0.6925

TC	52.737	54.126	55.862	58.292	61.070	63.153	62.806
FLO	4.067	4.711	5.749	7.060	8.472	9.739	11.040
PC	172.941	199.107	243.477	298.463	358.759	412.987	467.216
PC/PF	250.545	288.792	353.314	432.545	519.377	595.885	677.187
RHF	8.093	9.259	11.328	13.868	16.652	19.105	21.712
CT	17.494	20.187	24.729	30.308	36.421	41.809	47.532
P8/PF	0.8029	0.8495	0.9403	1.0356	1.1337	1.2167	1.3148
CPB	-0.0451	-0.0344	-0.0136	0.0081	0.0306	0.0495	0.0720
P3/PF	0.8941	0.9395	1.0236	1.1188	1.2222	1.3078	1.4007
P4/PF	0.7572	0.8065	0.8946	0.9900	1.0855	1.1632	1.2638
P5/PF	0.7572	0.8065	0.9027	0.9982	1.0935	1.1793	1.2799
P6/PF	0.9344	0.9435	0.9519	0.9578	0.9889	1.0269	1.0949
P7/PF	0.9748	0.9758	0.9833	0.9819	0.9809	0.9707	0.9901
P8/PF	0.9828	0.9838	0.9913	0.9900	0.9809	0.9787	0.9982
P9/PF	0.9828	0.9838	0.9913	0.9900	0.9809	0.9787	0.9982
P10/PF	0.9505	0.9517	0.9590	0.9693	0.9488	0.9467	0.9580
P11/PF	0.8458	0.8828	0.9187	0.9839	1.0774	1.1471	1.2398
P12/PF	0.9828	0.9838	0.9913	0.9900	0.9889	0.9867	1.0067
P13/PF	0.8056	0.8548	0.9590	1.0624	1.1820	1.2676	1.3927
P14/PF	0.7894	0.8387	0.9349	1.0303	1.1417	1.2275	1.3443
P15/PF	0.7330	0.7822	0.8623	0.9578	1.0533	1.1313	1.2398

Table IV. (Continued)

HJ = 3.80   THEJ = 20.00   DJ/DB = 0.800

MF   = 1.500
PF   = 2.100
RN/IN = .167

TC	76.348	71.834	68.014	64.195	62.112	61.070	61.070	61.417
FLO	----	----	0.516	0.961	1.476	1.927	2.301	2.897
PC	23.913	39.840	76.245	127.818	187.356	241.205	287.848	360.279
PC/PF	11.411	19.028	36.419	60.840	89.146	114.480	137.122	172.014
RMF	0.404	0.674	1.291	2.156	3.160	4.057	4.860	6.097
CT	0.443	1.009	2.303	4.120	6.225	8.110	9.794	12.390
PB/PF	0.2373	0.3199	0.3771	0.5098	0.6075	0.6869	0.7495	0.8308
CPB	-0.4843	-0.4318	-0.3955	-0.3112	-0.2492	-0.1988	-0.1591	-0.1074
P3/PF	0.2576	0.3349	0.3904	0.5239	0.6163	0.6966	0.7601	0.8414
P4/PF	0.2284	0.3137	0.3718	0.5054	0.6058	0.6860	0.7495	0.8308
P5/PF	0.2257	0.3110	0.3691	0.5001	0.6005	0.6781	0.7389	0.8202
P6/PF	0.8605	0.8639	0.8631	0.8653	0.8650	0.8628	0.8660	0.8733
P7/PF	0.9614	0.9623	0.9613	0.9606	0.9629	0.9631	0.9640	0.9635
P8/PF	0.9747	0.9729	0.9746	0.9765	0.9787	0.9783	0.9799	0.9794
P9/PF	0.9772	0.9729	0.9746	0.9765	0.9787	0.9763	0.9772	0.9794
P10/PF	0.9747	0.9729	0.9746	0.9765	0.9761	0.9?.5	0.9772	0.9741
P11/PF	0.9455	0.9463	0.9480	0.9500	0.9497	0.9499	0.9534	0.9556
P12/PF	1.0358	1.0341	1.0330	1.0347	1.0343	1.0343	1.0355	1.0352
P13/PF	0.2364	0.3217	0.3718	0.4949	0.6110	0.6860	0.7495	0.8308
P14/PF	0.2178	0.2977	0.3718	0.5001	0.6190	0.6966	0.7601	0.8467
P15/PF	0.2284	0.3137	0.3744	0.5054	0.6243	0.7019	0.7680	0.8520

TC	62.806	65.237	69.056	71.834	75.306	77.389	76.348
FLO	3.814	4.679	5.630	6.540	7.500	8.445	9.286
PC	473.286	581.742	697.782	808.514	926.071	1039.837	1138.054
PC/PF	225.135	277.000	331.298	387.106	437.096	485.718	551.883
RMF	7.979	9.818	11.742	13.720	15.492	17.215	19.560
CT	16.342	20.200	24.239	28.391	32.110	35.727	40.649
PB/PF	0.9379	1.0327	1.1227	1.2084	1.2688	1.3270	1.4012
CPB	-0.0394	0.0207	0.0779	0.1323	0.1707	0.2076	0.2548
P3/PF	0.9494	1.0442	1.1350	1.2191	1.2793	1.3374	1.4111
P4/PF	0.9388	1.0362	1.1271	1.2111	1.2741	1.3296	1.4030
P5/PF	0.9256	1.0176	1.1060	1.1951	1.2530	1.3140	1.3896
P6/PF	0.8965	0.9408	1.0030	1.0780	1.1480	1.2283	1.3303
P7/PF	0.9653	0.9646	0.9634	0.9715	0.9614	0.9660	0.9802
P8/PF	0.9785	0.9779	0.9766	0.9822	0.9746	0.9764	0.9883
P9/PF	0.9785	0.9779	0.9740	0.9795	0.9719	0.9738	0.9883
P10/PF	0.9758	0.9752	0.9740	0.9795	0.9693	0.9738	0.9910
P11/PF	0.9705	1.0044	1.0664	1.1392	1.2110	1.2881	1.3680
P12/PF	1.0340	1.0335	1.0321	1.0407	1.0271	1.0309	1.0530
P13/PF	0.9388	1.0388	1.1271	1.2164	1.2714	1.3348	1.4192
P14/PF	0.9600	1.0653	1.1561	1.2511	1.3082	1.3633	1.4219
P15/PF	0.9626	1.0683	1.1535	1.2457	1.3030	1.3660	1.4488

Table IV. (Continued)

MJ = 3.8)   THEJ = 20.00   DJ/DB = 0.800

MF   = 2.500
PF   = .689
RN/IN = .167

TC	61.417	57.598	55.167	53.084	51.695	50.653	49.959	49.612
FLO	----	----	0.466	0.962	1.448	1.946	2.396	2.858
PC	27.320	45.523	72.827	127.434	183.179	242.716	296.944	354.585
PC/PF	39.580	65.947	105.668	184.736	265.517	352.065	430.318	515.641
RMF	0.505	0.841	1.348	2.357	3.388	4.492	5.491	6.579
CT	0.914	1.620	2.684	4.801	6.965	9.282	11.378	13.663
PB/PF	0.4269	0.4967	0.4818	0.5580	0.5937	0.6425	0.6856	0.7439
CPB	-0.1310	-0.1150	-0.1184	-0.1010	-0.0929	-0.0817	-0.0719	-0.0585
P3/PF	0.4912	0.5638	0.5491	0.6197	0.6529	0.7017	0.7420	0.8005
P4/PF	0.3947	0.4671	0.4523	0.5312	0.5642	0.6129	0.6614	0.7197
P5/PF	0.3947	0.4591	0.4441	0.5232	0.5642	0.6129	0.6534	0.7115
P6/PF	0.8859	0.8779	0.8721	0.8852	0.8786	0.8871	0.8792	0.8813
P7/PF	0.9746	0.9744	0.9609	0.9739	0.9671	0.9759	0.9599	0.9703
P8/PF	0.9987	0.9906	0.9852	0.9980	0.9913	0.9920	0.9841	0.9946
P9/PF	0.9826	0.9744	0.9699	0.9819	0.9753	0.9759	0.9679	0.9783
P10/PF	0.9666	0.9584	0.9529	0.9657	0.9590	0.9597	0.9519	0.9541
P11/PF	0.9423	0.9343	0.9286	0.9416	0.9349	0.9356	0.9276	0.9380
P12/PF	0.9906	0.9826	0.9771	0.9900	0.9833	0.9840	0.9761	0.9783
P13/PF	0.3947	0.4752	0.4523	0.5232	0.5642	0.6129	0.6534	0.7034
P14/PF	0.3867	0.4591	0.4523	0.5232	0.5722	0.6213	0.6696	0.7357
P15/PF	0.3947	0.4591	0.4523	0.5232	0.5642	0.6129	0.6534	0.7115

TC	49.264	50.653	54.473	57.251	60.376	63.501	65.931	67.320
FLO	2.788	-3.823	4.820	5.710	6.684	7.572	8.479	9.370
PC	345.105	470.246	592.734	701.570	817.611	925.309	1034.903	1139.947
PC/PF	501.588	682.022	860.840	1017.223	1185.683	1338.865	1493.314	1646.625
RMF	6.400	8.702	10.984	12.979	15.129	17.083	19.054	21.010
CT	13.287	18.119	22.908	27.096	31.607	35.710	39.846	43.952
PB/PF	0.7326	0.8440	0.9675	1.0723	1.1974	1.3114	1.4282	1.5393
CPB	-0.0611	-0.0356	-0.0074	0.0165	0.0451	0.0712	0.0979	0.1233
P3/PF	0.7919	0.8951	1.0187	1.1287	1.2485	1.3677	1.4843	1.5982
P4/PF	0.7029	0.8225	0.9459	1.0561	1.1759	1.2953	1.4041	1.5099
P5/PF	0.7029	0.8145	0.9378	1.0320	1.1678	1.2712	1.3961	1.5099
P6/PF	0.8808	0.8871	0.8974	0.9433	1.0310	1.1022	1.1634	1.2529
P7/PF	0.9696	0.9677	0.9701	0.9754	0.9746	0.9736	0.9708	0.9799
8/PF	0.9939	0.9918	0.9862	0.9917	0.9906	0.9896	0.9869	0.9879
P9/PF	0.9696	0.9758	0.9701	0.9754	0.9746	0.9736	0.9708	0.9799
P10/PF	0.9534	0.9597	0.9539	0.9594	0.9585	0.9493	0.9628	0.9638
P11/PF	0.9373	0.9435	0.9459	0.9754	1.0631	1.1586	1.2275	1.2850
P12/PF	0.9777	0.9838	0.9782	0.9835	0.9906	0.9816	0.9869	0.9879
P13/PF	0.7029	0.8145	0.9216	1.0320	1.1518	1.2551	1.3800	1.5019
P14/PF	0.7354	0.8468	0.9701	1.0884	1.2162	1.3354	1.4521	1.5581
P15/PF	0.7111	0.8225	0.9378	1.0481	1.1678	1.2873	1.3881	1.5019

Table IV. (Concluded)

MJ = 2.00   THEJ = 20.00   DJ/DB = 0.800

MF   = 1.500
PF   = 2.146
RN/IN = .167

TC	51.820	50.778	49.042	50.778	52.514	49.042
FLO	1.371	2.231	3.926	6.740	9.673	1.739
PC	27.354	41.006	74.377	127.468	183.593	238.958
PC/PF	12.979	19.536	35.335	58.009	87.654	111.403
RMF	1.887	2.841	5.138	8.436	12.019	16.200
CT	4.043	6.290	11.706	19.478	27.925	37.780
PB/PF	0.7398	0.9234	1.2558	1.4859	1.5844	1.6477
CPB	-0.1652	-0.0486	0.1624	0.3085	0.3710	0.4112
P3/PF	0.7618	0.9375	1.2805	1.5011	1.5952	1.6589
P4/PF	0.7354	0.9190	1.2646	1.4834	1.5802	1.6408
P5/PF	0.7222	0.9136	1.2223	1.4733	1.5777	1.6434
P6/PF	0.8888	0.9216	1.1244	1.4252	1.5276	1.5863
P7/PF	0.9496	0.9535	0.9630	0.9645	1.3072	1.5006
P8/PF	0.9523	0.9562	0.9630	0.9493	0.9641	1.0229
P9/PF	0.9496	0.9562	0.9603	0.9442	0.9566	0.9658
P10/PF	1.0026	1.0093	1.0159	0.9974	1.0092	1.0229
P11/PF	0.8835	0.9110	1.1244	1.3720	1.4475	1.4902
P12/PF	1.0211	1.0279	1.0344	1.0176	1.0743	1.3085
P13/PF	0.7116	0.9402	1.2223	1.4505	1.5651	1.6330
P14/PF	0.7248	0.9349	1.1984	1.3847	1.4450	1.5058
P15/PF	0.7433	0.9508	1.2196	1.4581	1.5577	1.6200

TABLE IV-B   BASIC TEST DATA

MJ = 2.00   THEJ = 20.00   DJ/DB = 0.800

MF   = 2.500
PF   = .693
RN/IN = .167

TC	39.320	38.278	38.973	40.362	45.570	50.084
FLO	1.340	2.382	3.707	6.839	9.606	1.757
PC	25.079	44.419	69.447	128.605	182.075	240.095
PC/PF	36.370	64.324	100.794	185.745	259.845	345.918
RMF	1.904	3.367	5.277	9.724	13.603	18.109
CT	4.342	7.791	12.291	22.774	31.918	42.539
PB/PF	0.8497	1.1331	1.4431	1.9767	2.1466	2.2845
CPB	-0.0343	0.0304	0.1013	0.2232	0.2621	0.2936
P3/PF	0.9358	1.2163	1.5213	2.0409	2.2126	2.3459
P4/PF	0.8148	1.1036	1.4243	1.9446	2.1096	2.2499
P5/PF	0.7986	1.0793	1.3838	1.9446	2.1175	2.2577
P6/PF	-0.9197	0.9666	1.1410	1.7276	1.9827	2.1217
P7/PF	0.9761	0.9748	0.9712	0.9883	0.9992	1.2570
P8/PF	0.9601	0.9585	0.9467	0.9642	0.9595	0.9848
P9/PF	0.9681	0.9666	0.9549	0.9642	0.9676	0.9848
P10/PF	1.0164	1.0149	1.0035	1.0123	1.0151	1.0409
P11/PF	0.8792	0.9102	1.1087	1.4463	1.7845	1.8496
P12/PF	0.9761	0.9748	0.9712	0.9883	0.9913	1.0088
P13/PF	0.7502	0.9908	1.2625	1.7517	1.9430	2.0177
P14/PF	0.7342	0.9666	1.2300	1.7276	1.8637	1.9056
P15/PF	0.7825	1.0149	1.3110	1.8159	1.9668	2.0336
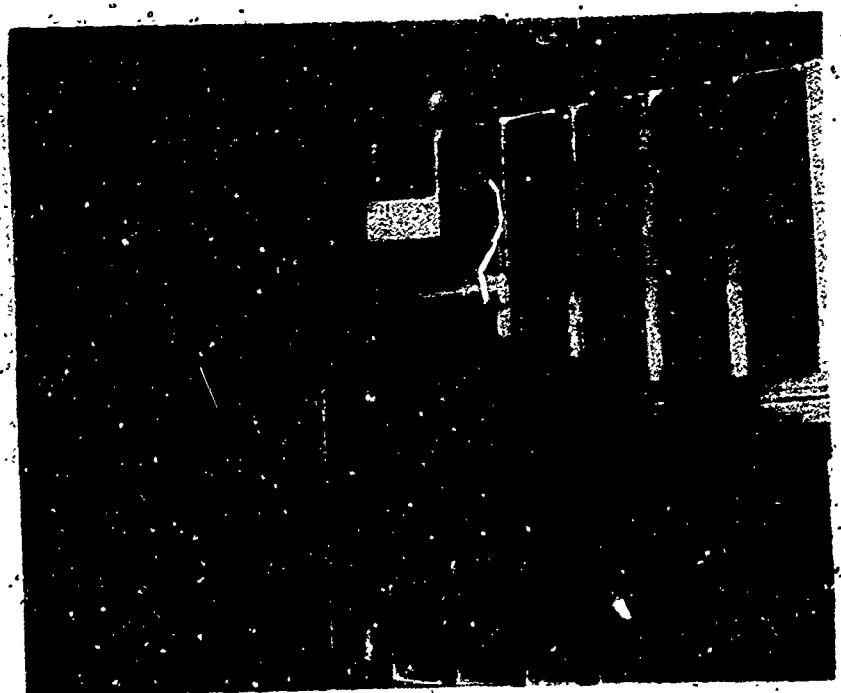
Figure 1. Side View of Model Installed

32
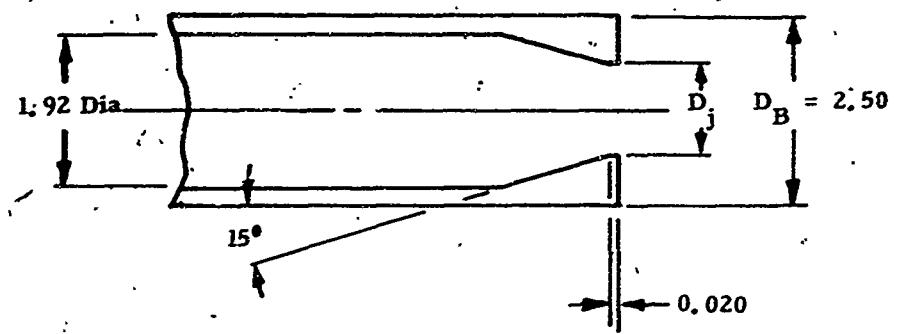
a. Sonic Nozzles
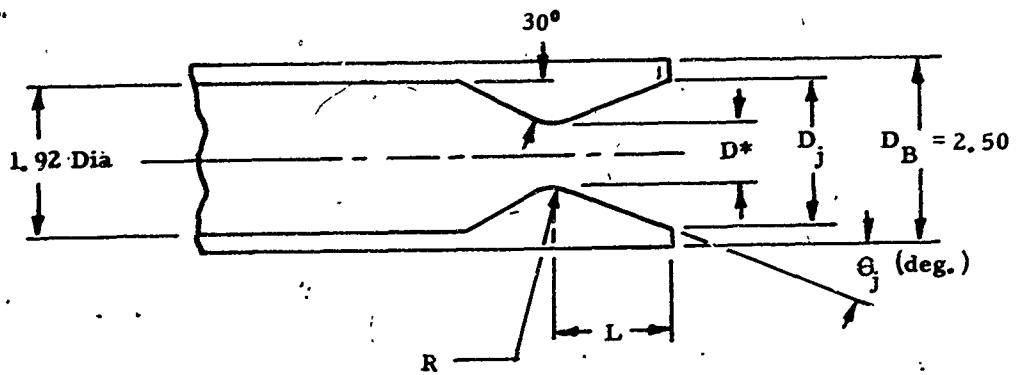
b. Conical Nozzles
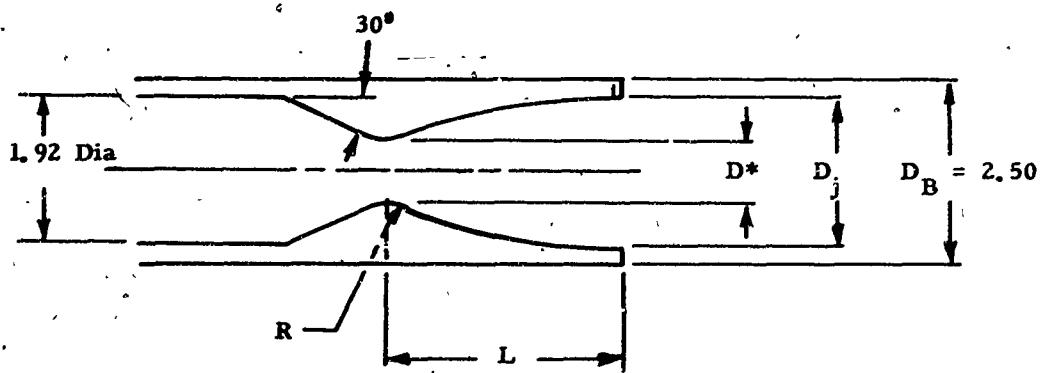
c. Contour Nozzles.

Figure 2. Sketch of Models

33

Orifice Number
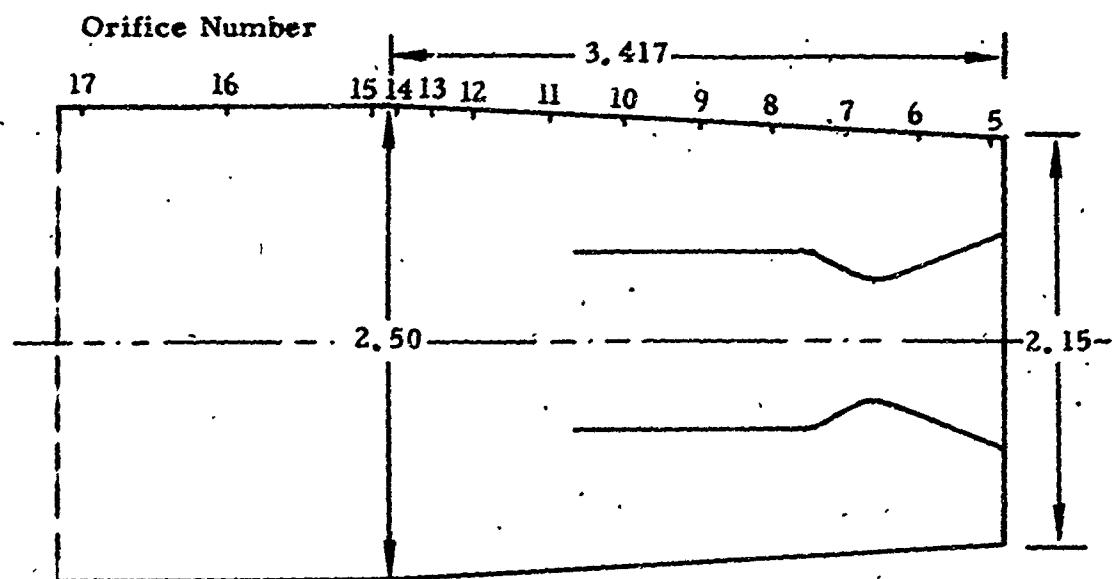
Conical Nozzle 2.7~20~.45
With Boattail Afterbody

Orifice Number
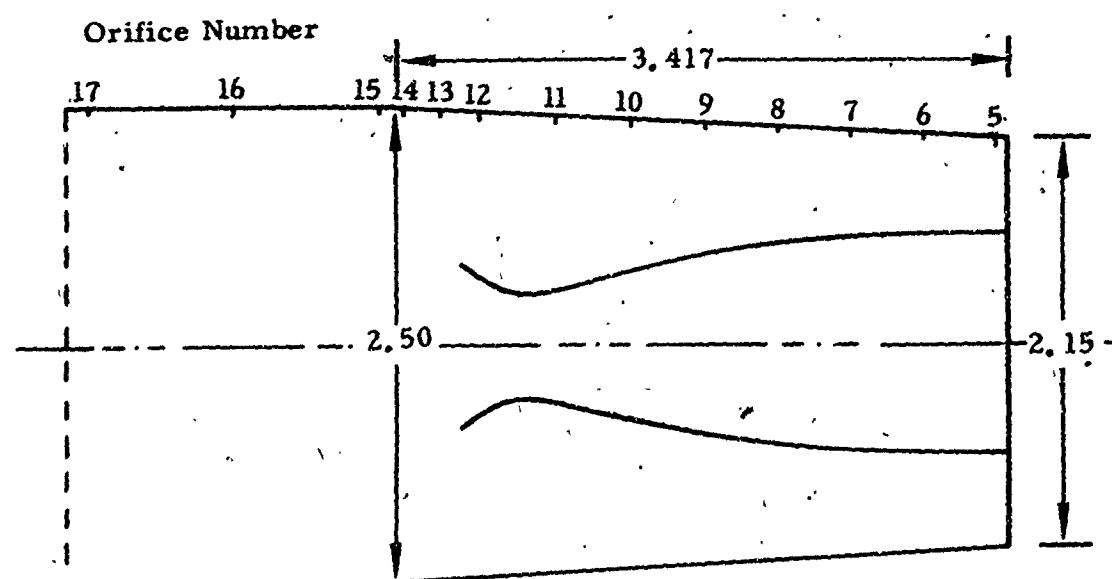
Contour Nozzle 3.0-0~.456
With Boattail Afterbody

Figure 2. (Concluded)

34

a. Nozzle Configuration (2.7-0-0.80)

b. Nozzle Configuration (3.0-0-0.456), with boattail
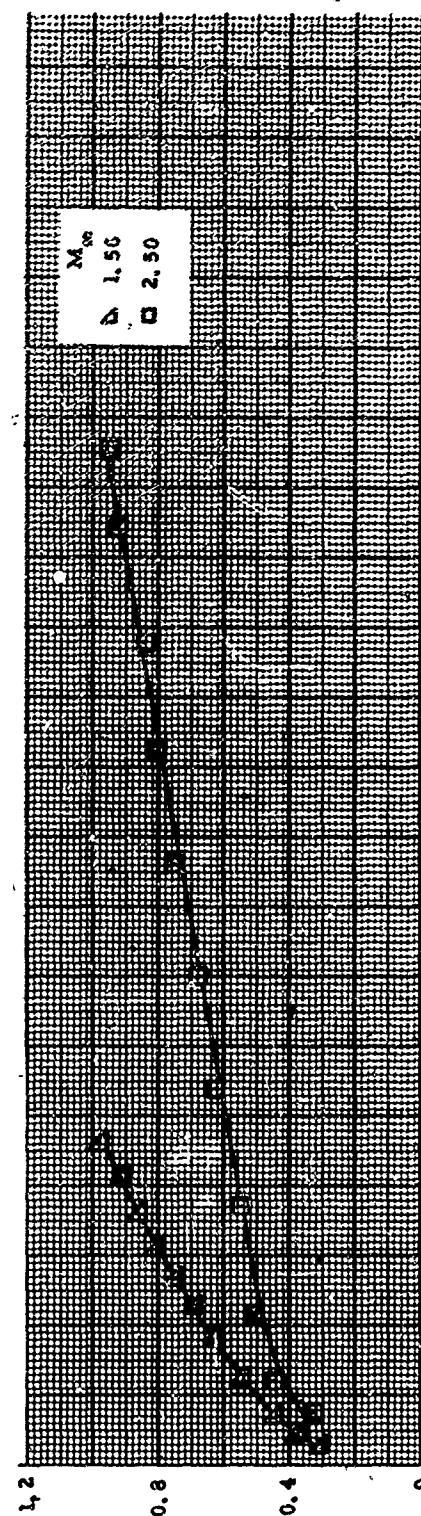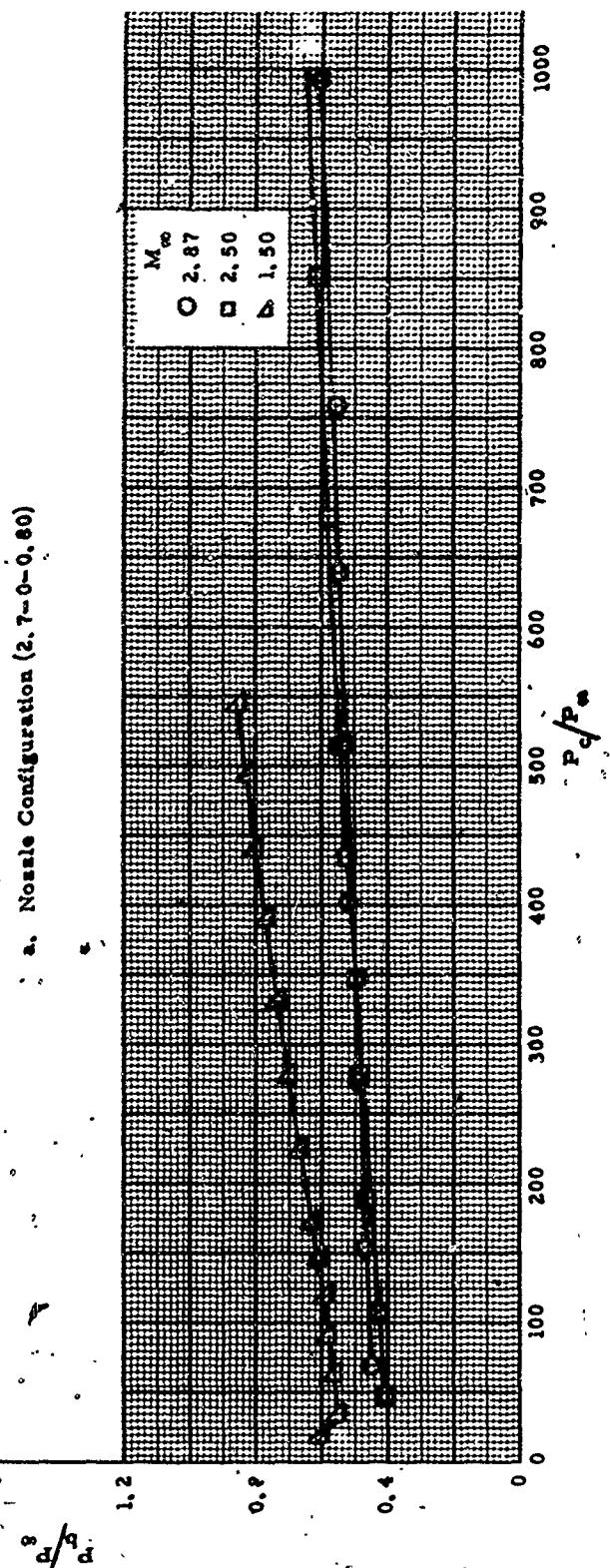
Figure 3. Measured Base Pressure as a Function of Chamber Pressure

35

c. Nozzle Configuration (1.0-0-.45)

Figure 3. (Continued)

36

M∞

△ 1.50
□ 2.50

d. Nozzle Configuration (2.0—10—0.80)

e. Nozzle Configuration (2.7—10—0.80)

P_c/P_∞

P_b'/P_∞

Figure 3. (Continued)

f. Nozzle Configuration (2.7-20-0.45), with boattail

g. Nozzle Configuration (2.7-20-0.30)

Figure 3. (Continued)

38
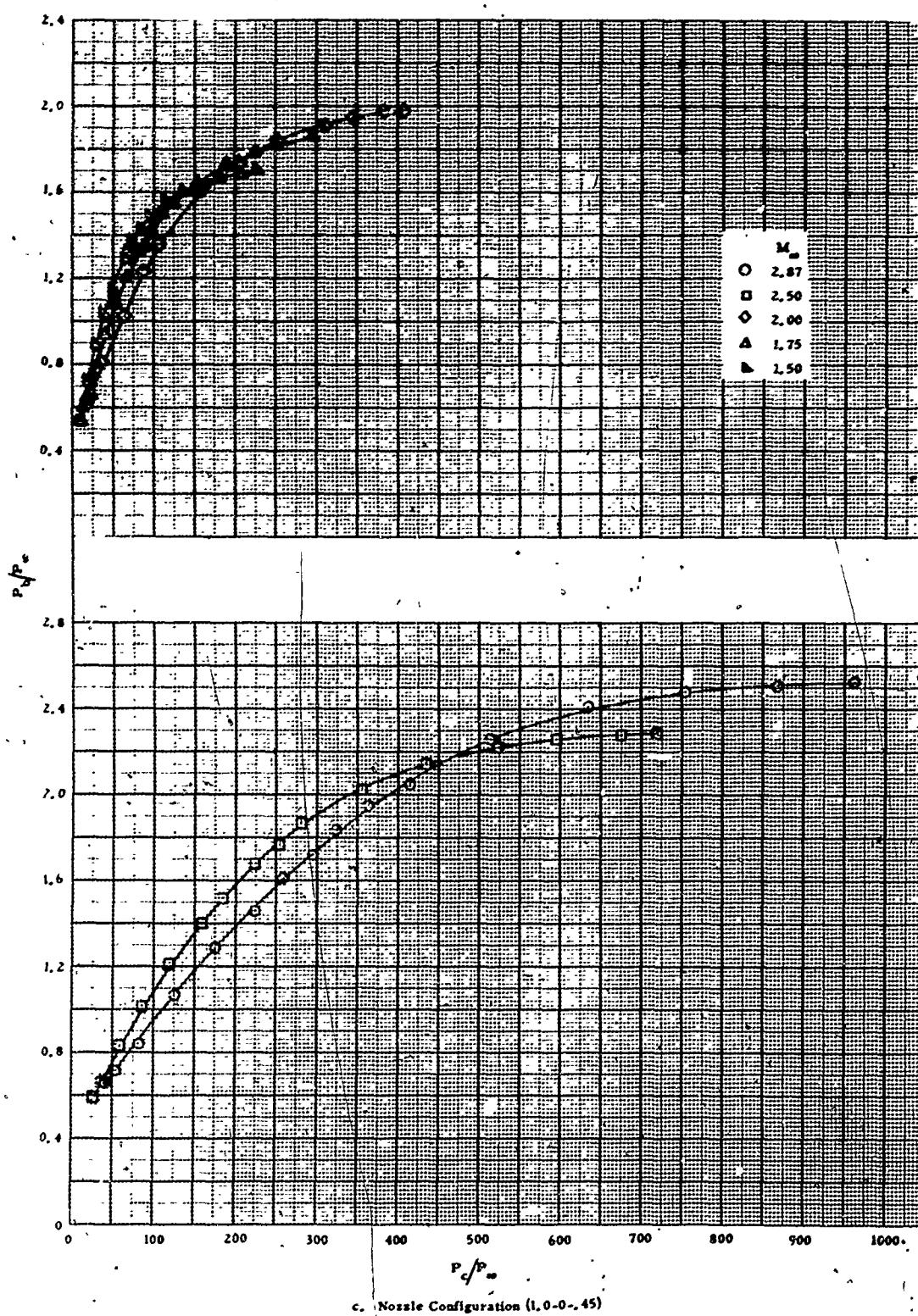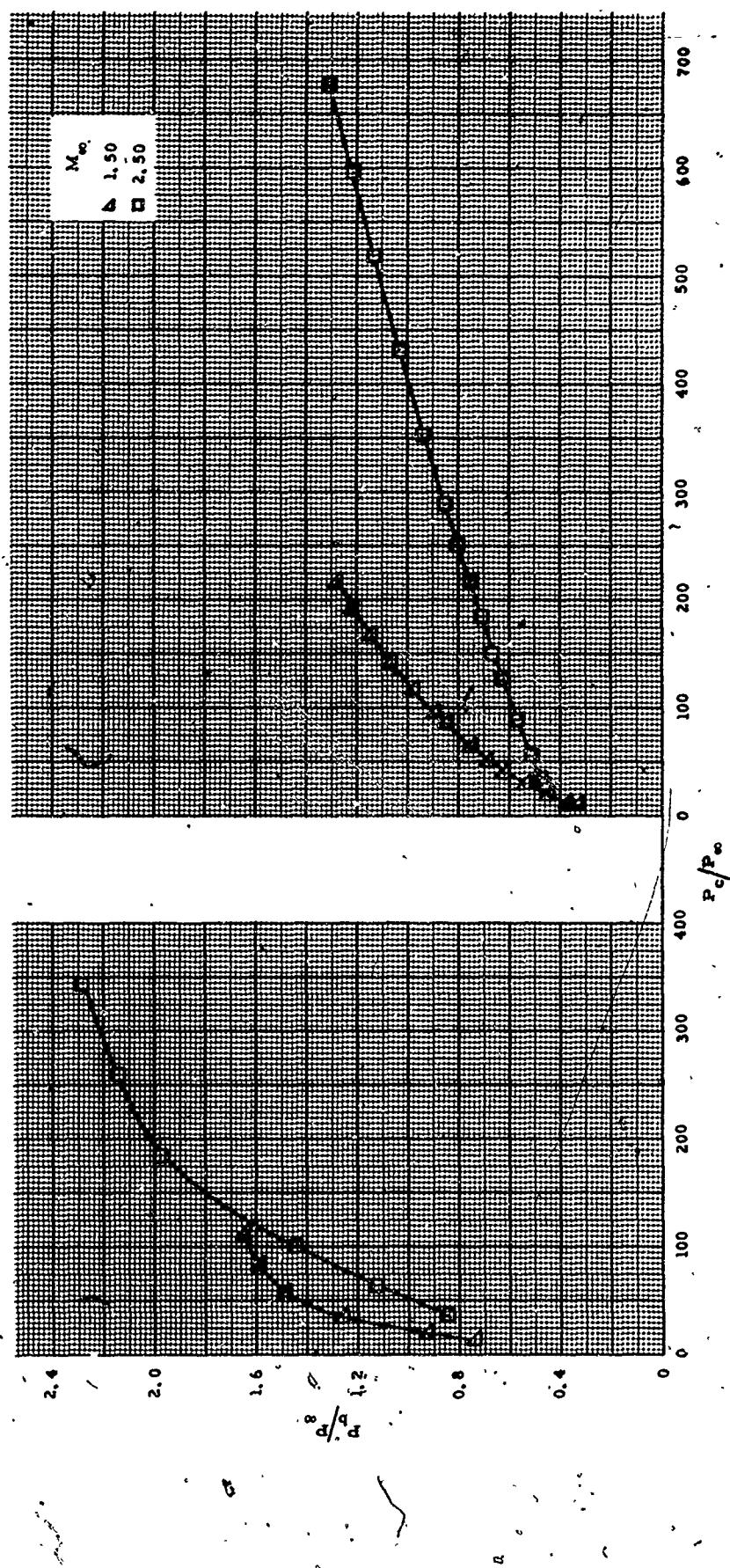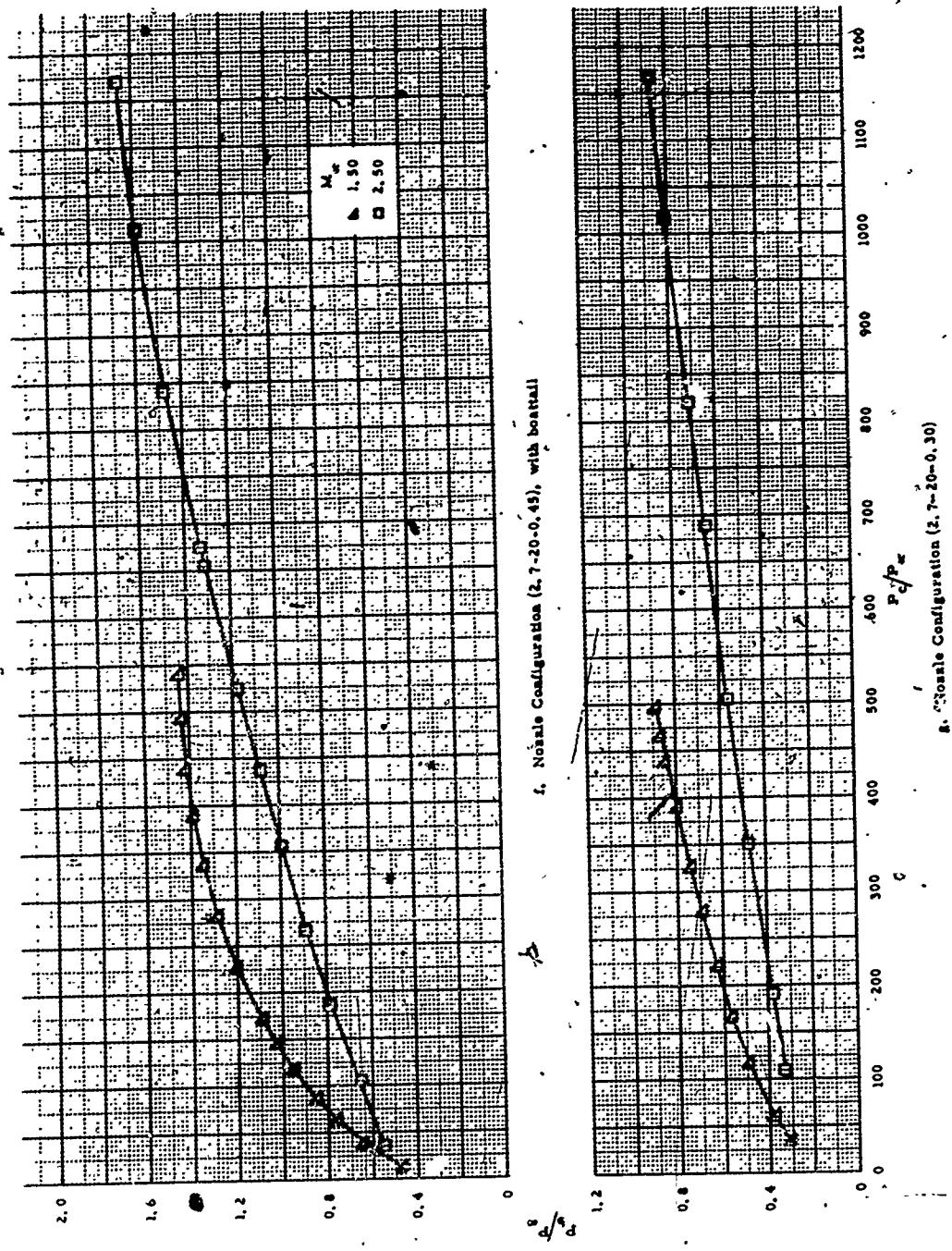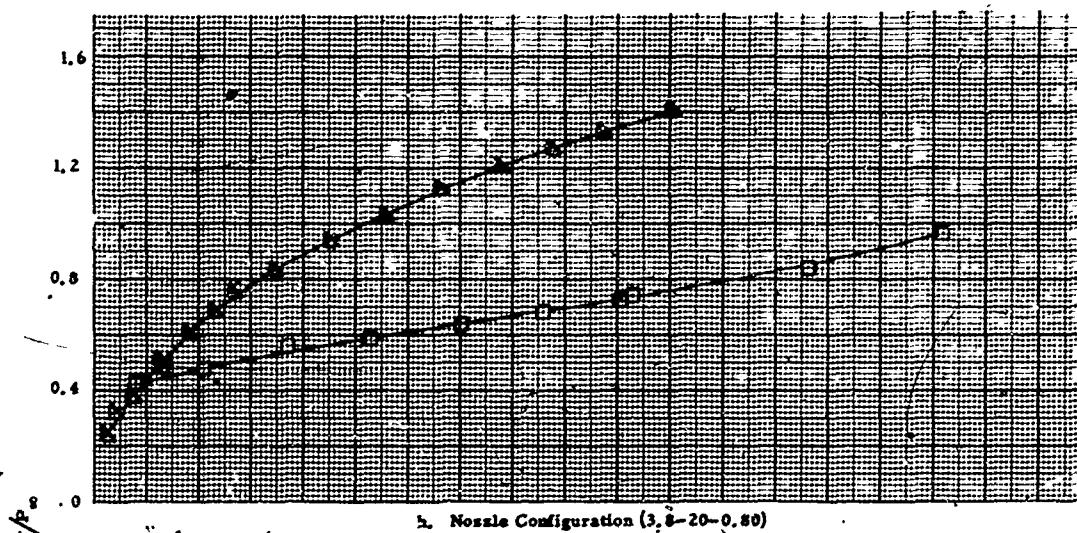
h. Nozzle Configuration (3.8-20-0.80)

i. Nozzle Configuration (2.7-20-.80)

	M_∞
△	1.50
◇	2.00
▢	2.50
○	2.87

Figure 3. (Concluded)

39

P_c/P_∞	C_T
○ 111	37.8
□ 83	27.9
◇ 58	19.5
▲ 35	11.7
△ 20	6.3
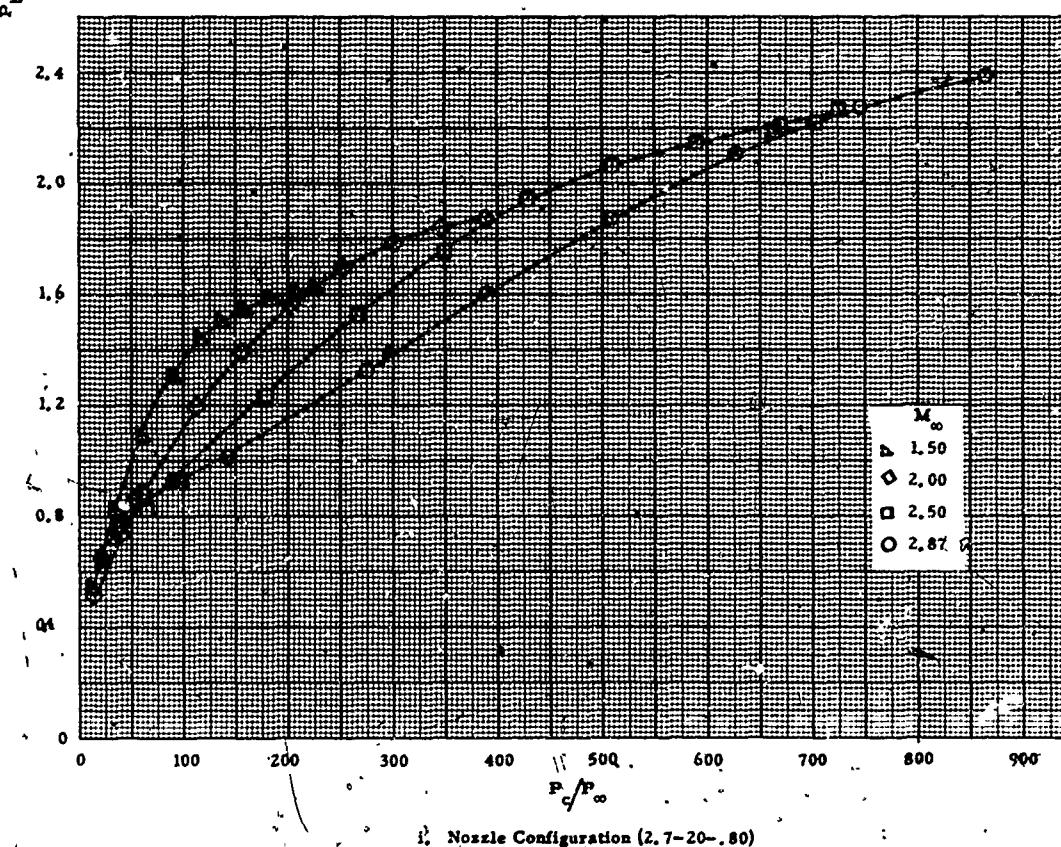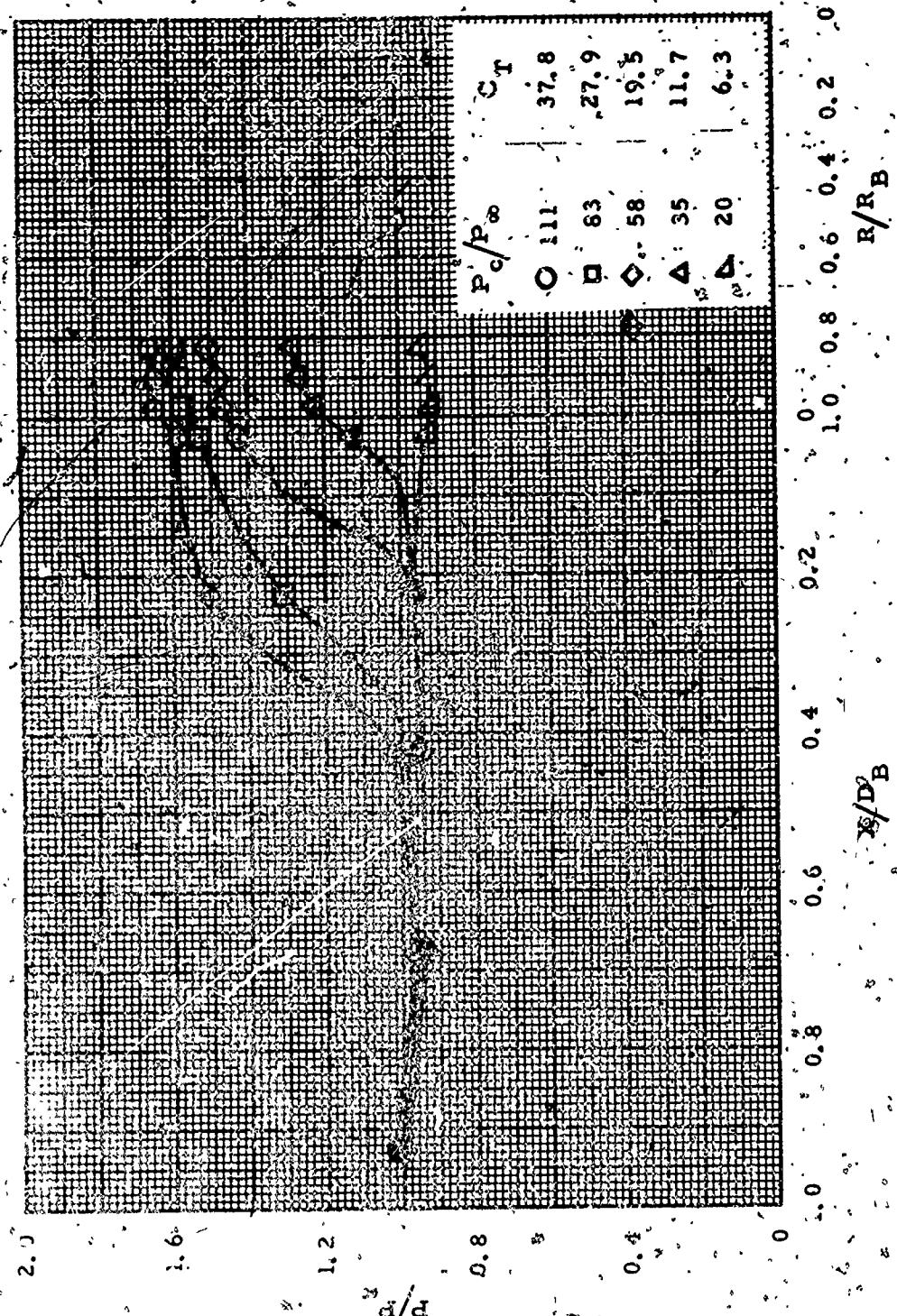
a. Nozzle Configuration (2.0–10–.80) $M_\infty \cong 1.5$

Figure 4. Pressure distribution on afterbody for Various Chamber Pressures

40

	P_C/P_∞	C_T
O	346	42.5
□	260	31.9
◇	186	22.8
△	101	12.3
△	64	7.8
□	36	4.3

p/p_∞

x/D_B

R/R_B

b. Nozzle Configuration (2.0→10-.80) $M_\infty = 2.5$

Figure 4. (Continued)

	P_c/P'_∞	C_T
○	228	37.0
▢	206	33.5
◇	178	28.9
▲	157	25.4
◣	114	18.6
▫	72	11.7
○	48	7.7

x/D_B

c. Nozzle Configuration (1.0−0−.45) $M_\infty = 1.5$

Figure 4. (Continued)

P_c/P_∞	C_T
295	35.2
255	30.4
225	26.8
153	18.2
97	11.5
53	6.3
24	2.8
10	1.1
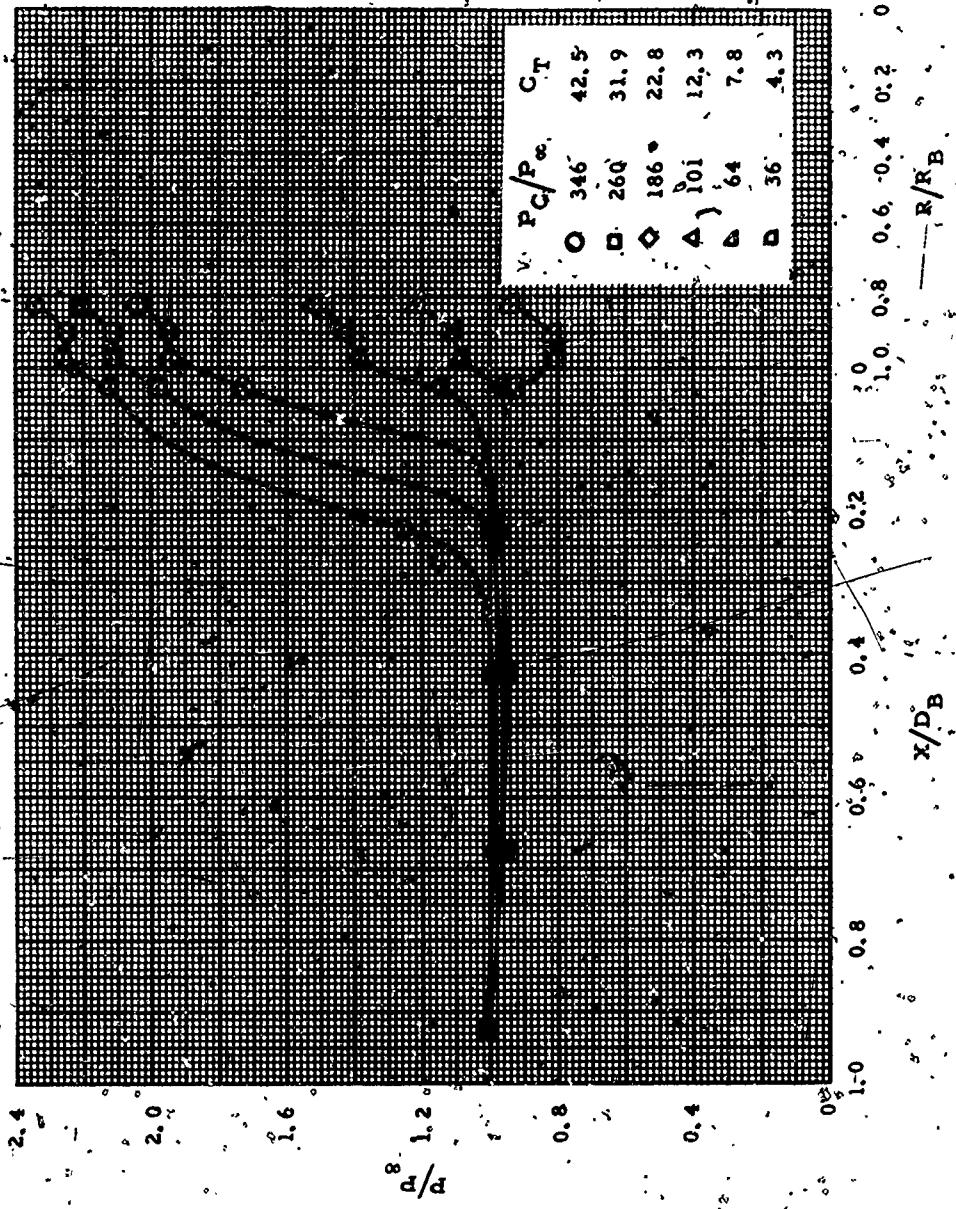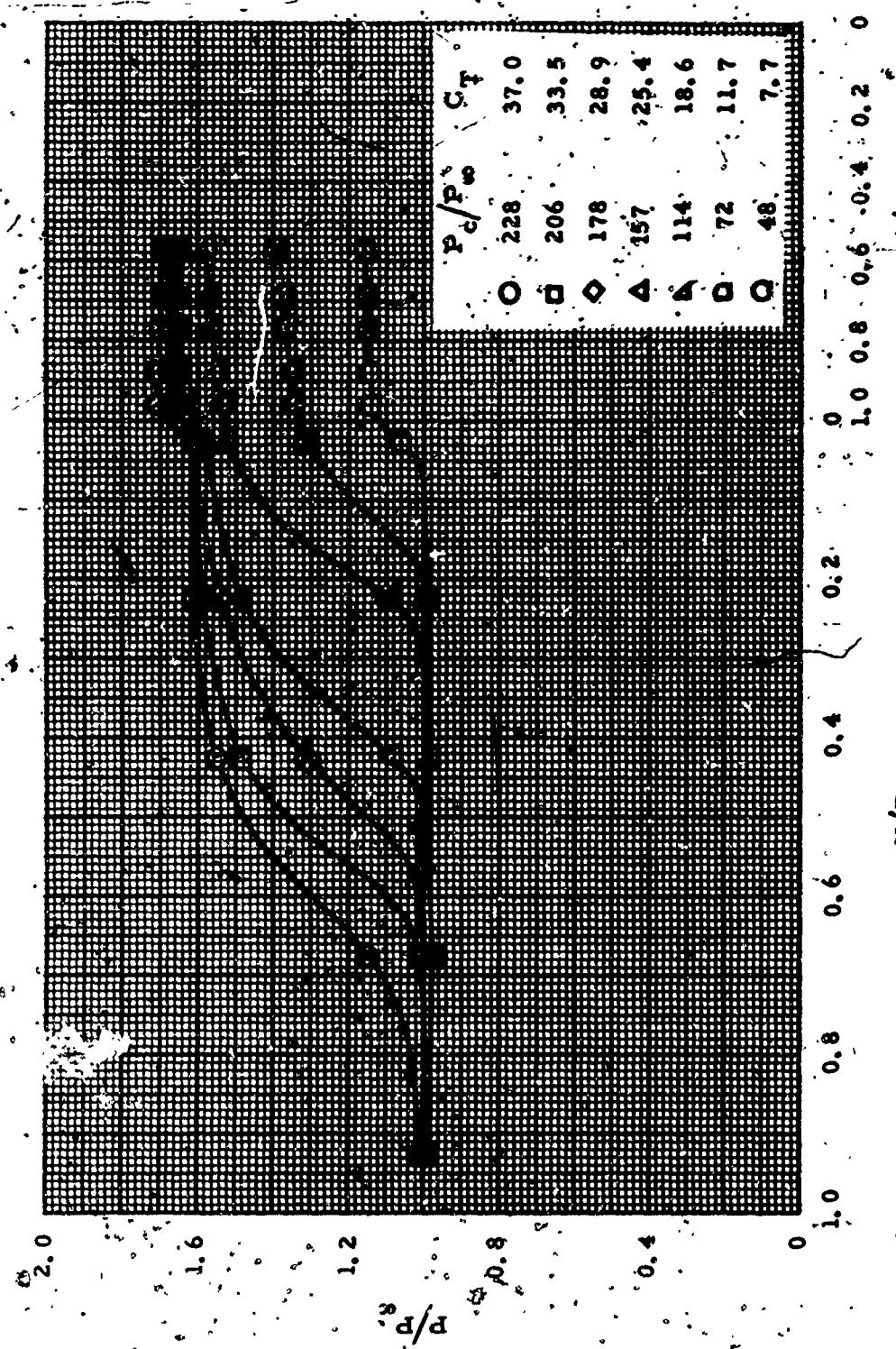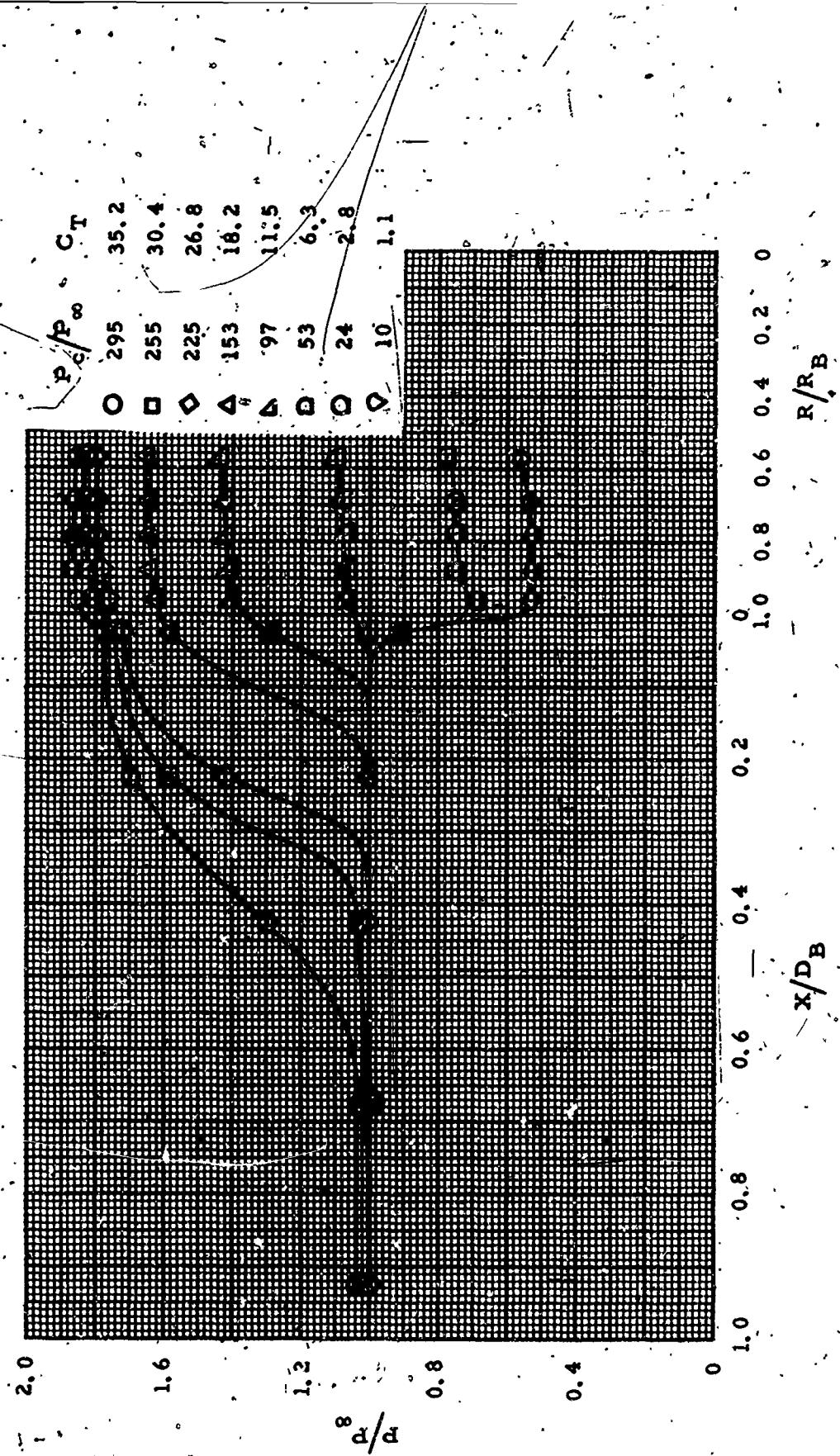
d. Nozzle Configuration (1.0-0-.45) $M_\infty = 1.75$

Figure 4. (Continued)

e. Nozzle Configuration (1.0−0−.45) $M_\infty = 2.00$

Figure 4. (Continued)

	P_c/P_∞	C_T
○	407	37.3
□	384	35.1
◇	345	31.5
▲	310	28.3
▲	252	23.1
◘	159	14.5
◙	87	7.9

	P_c/P_∞	C_T
O	596	34.9
□	523	30.6
◇	434	25.4
△	356	20.9
◢	255	14.9
◻	158	9.2
◯	86	5.0
◇	28	1.6

P/P_∞

x/D_B

R/R_B
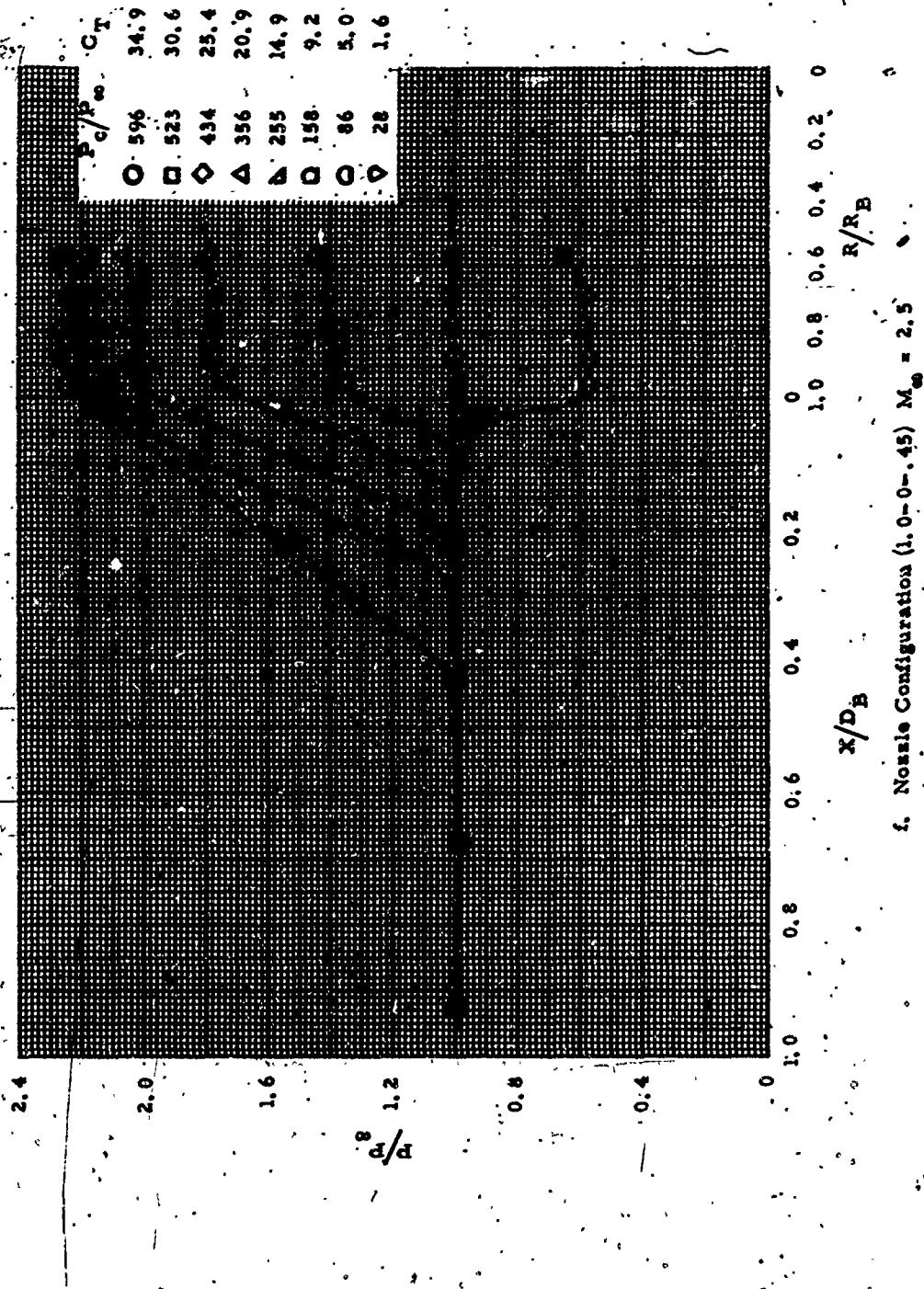
f. Nozzle Configuration (1.0—0—.45) $M_\infty = 2.5$

Figure 4. (Continued)

P_c/P_∞	C_T
○ 225	43.7
□ 182	35.1
◇ 158	30.5
△ 135	25.9
▲ 115	22.0
◻ 87	7.8
○ 58	10.9
◇ 32	5.9

R/R_B

$M_\infty = 1.5$

x/D_B

p/p_∞

g. Nozzle Configuration (2.7-20-0.60) $M_\infty = 1.5$
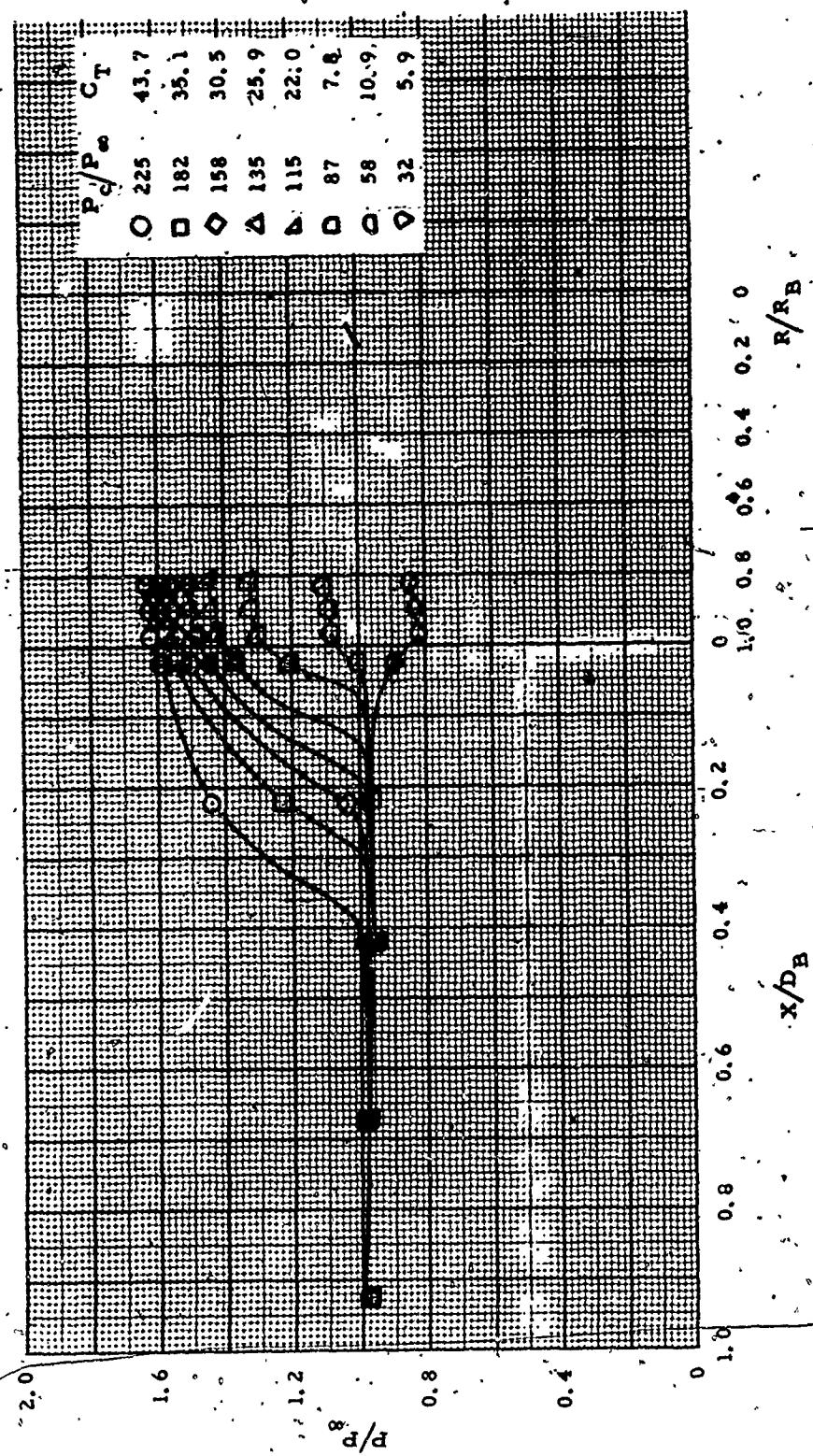
Figure 4. (Concluded).
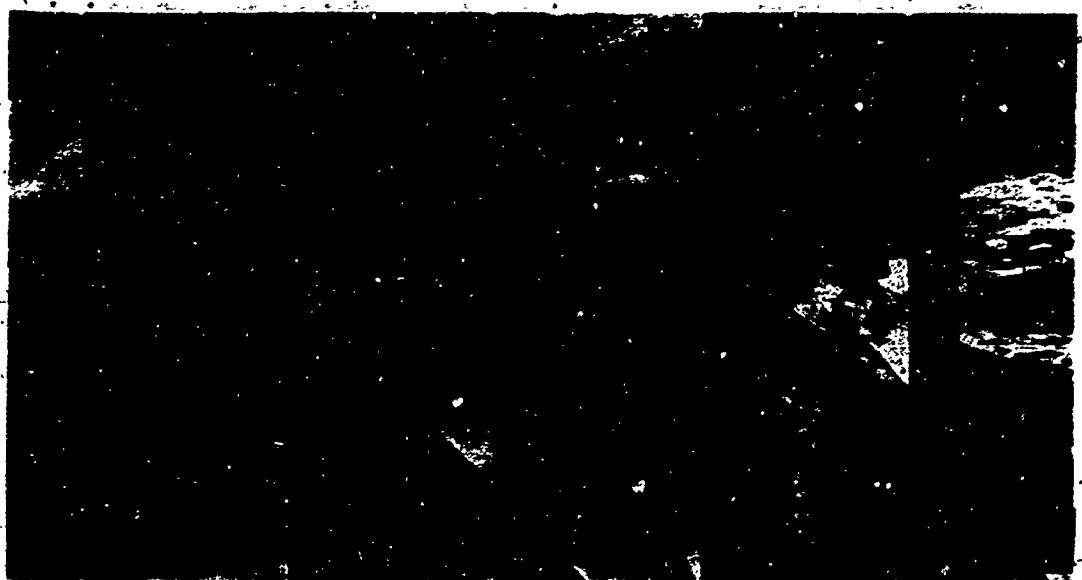
a. 1.0-0-0.45 $M_\infty = 1.50$ $P_c/P_\infty = 115$

b. 1.0-0-0.45 $M_\infty \doteq 1.50$ $P_c/P_\infty = 136$

Figure 5. Selected Schlierens

47
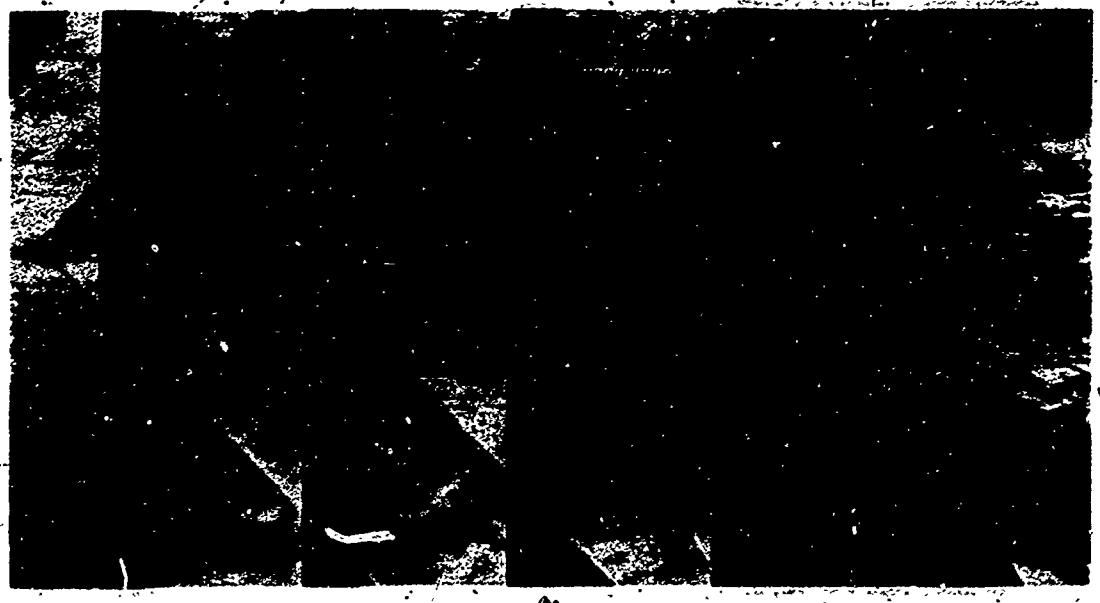
c. 1.0-0-0.45 $M_\infty = 1.50$ $P_c/P_\infty = 178$
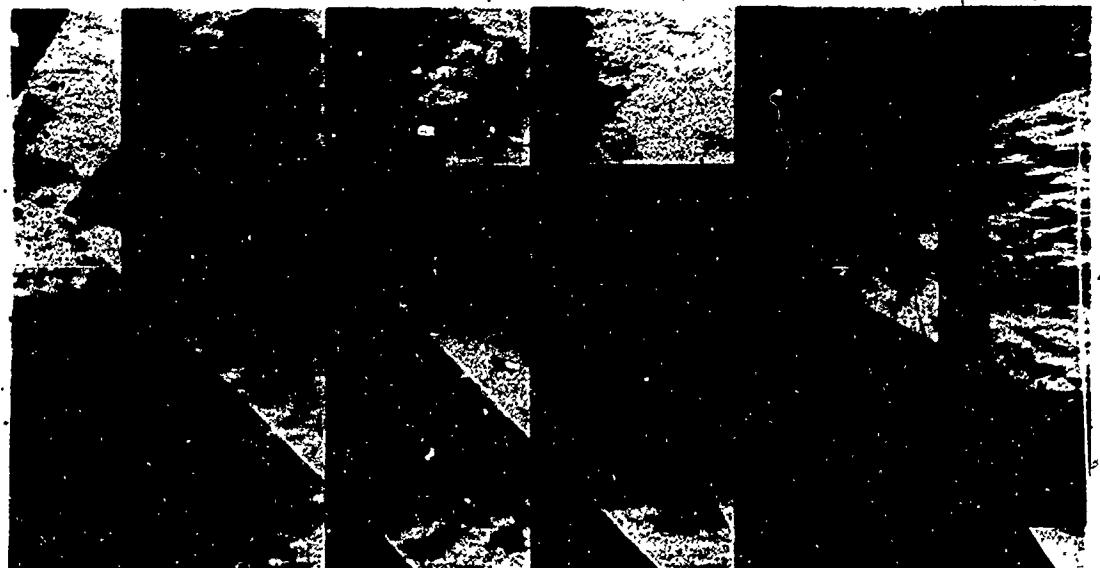
d. 1.0-0-0.45 $M_\infty = 1.50$ $P_c/P_\infty = 228$

Figure 5. (Continued)

48
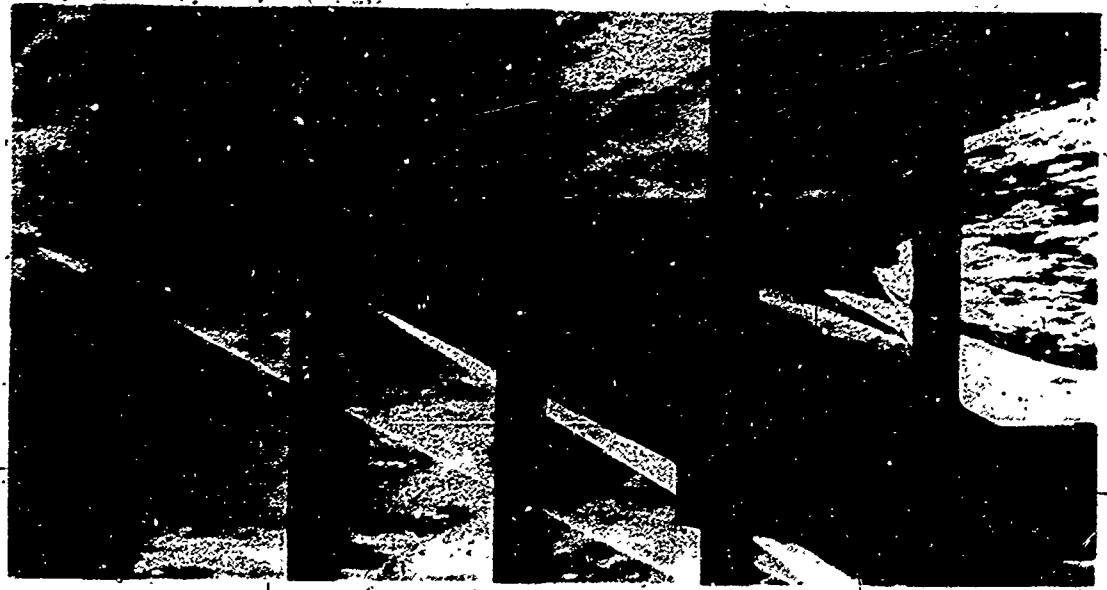
e. $1.0-0-0.45$ $M_\infty = 2.50$ $P_c/P_\infty \doteq 675$

f. $1.0-0-0.45$ $M_\infty = 2.87$ $P_c/P_\infty = 1004$

Figure 5. (Continued)

g.   2.7-20-0.800 $M_\infty = 1.5$ $P_c/P_\infty = 225$
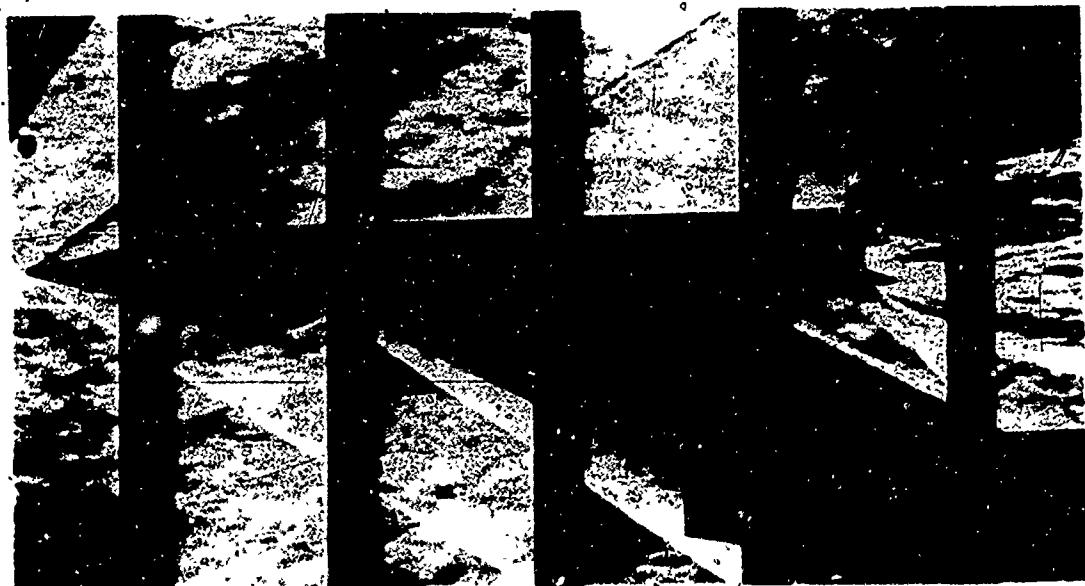
h.   2.7-20-0.800 $M_\infty = 2.00$ $P_c/P_\infty = 389$

Figure 5.   (Concluded)

50
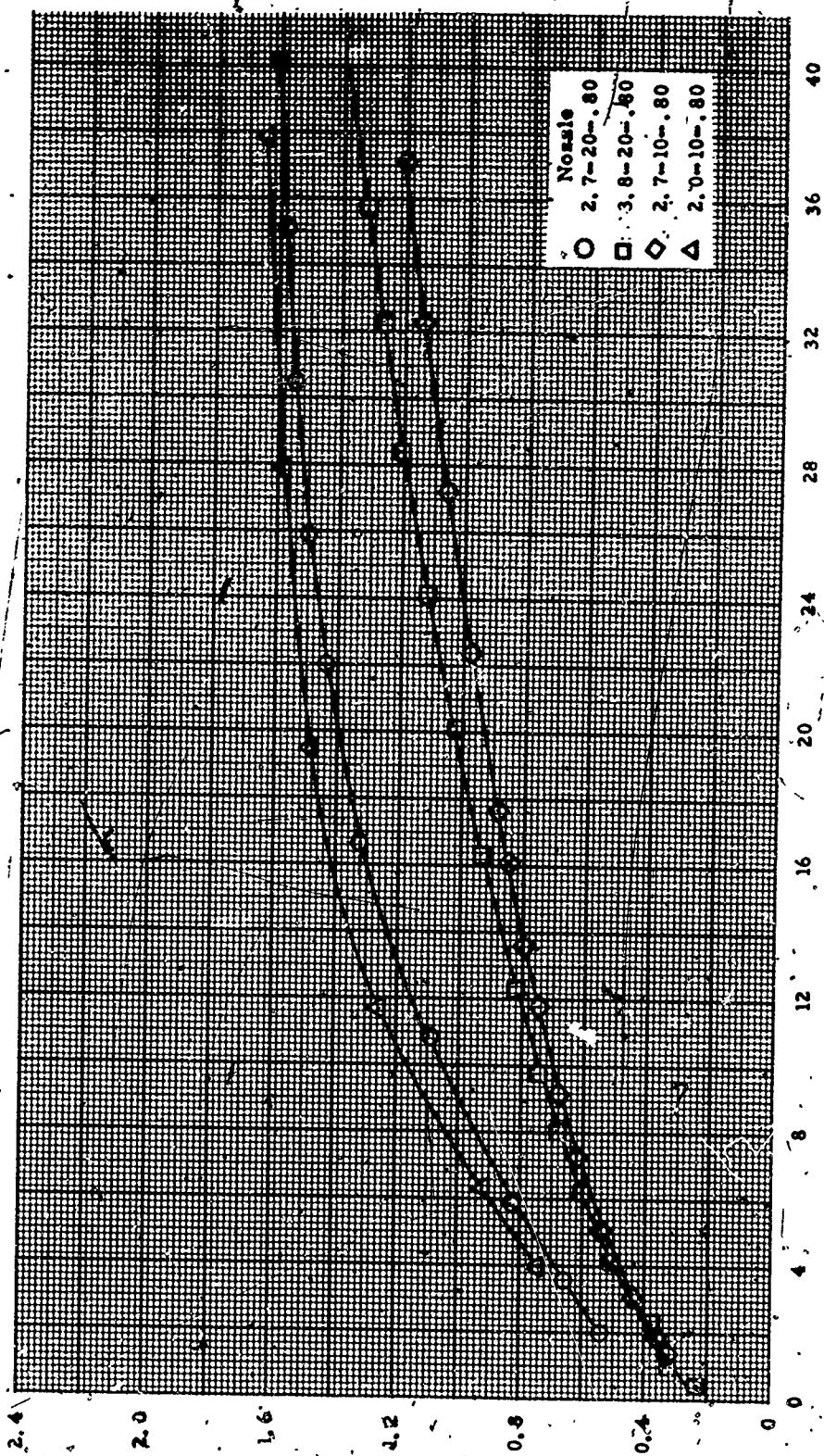
a. Nozzle Expansion Angle and Exit Mach Number, $M_\infty = 1.5$

Figure 6. Effects of Nozzle Geometry on Base Pressure
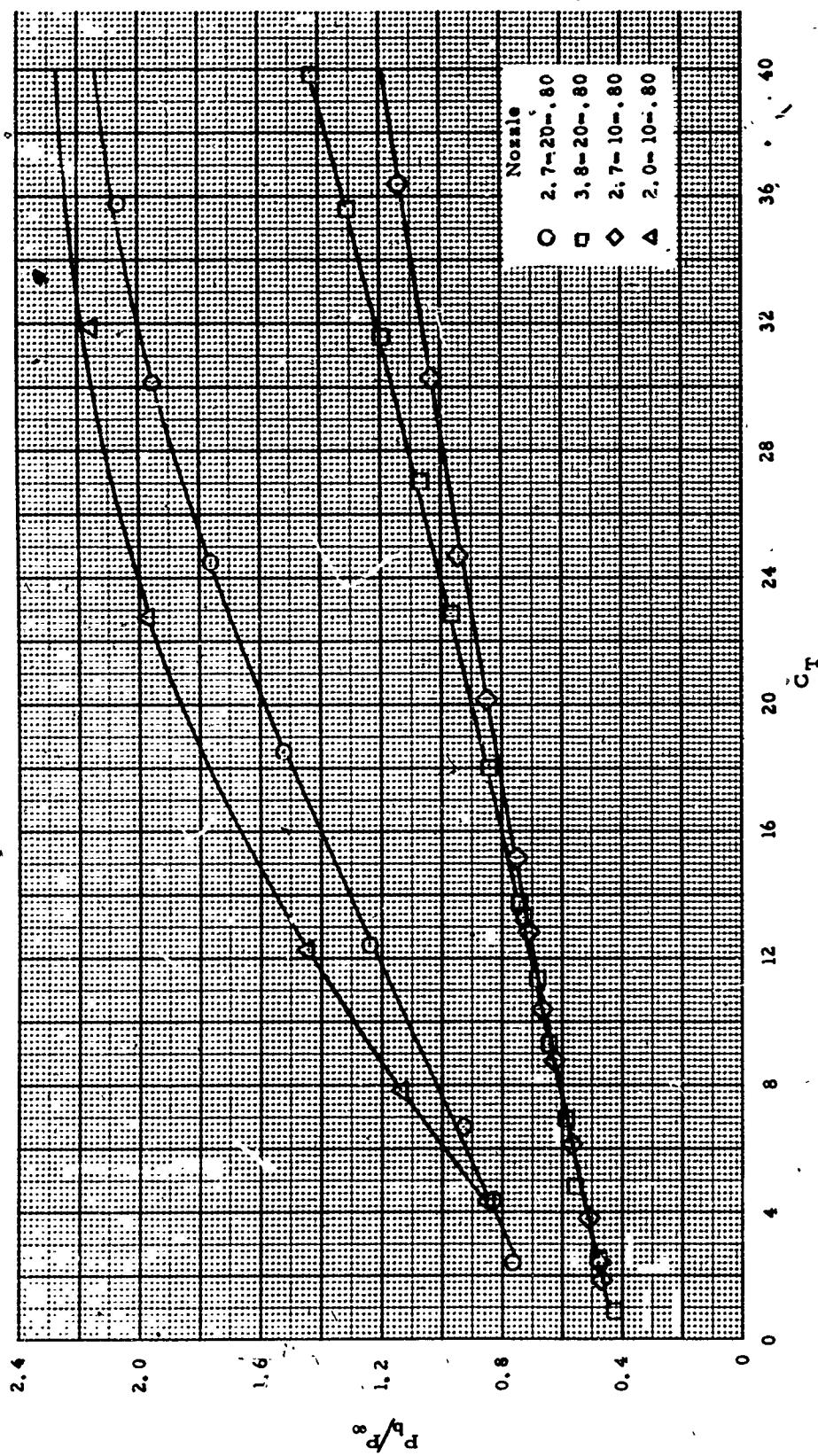
b. Nozzle Expansion Angle and Exit Mach Number. $M_\infty = 2.5$

Figure 6. (Continued)
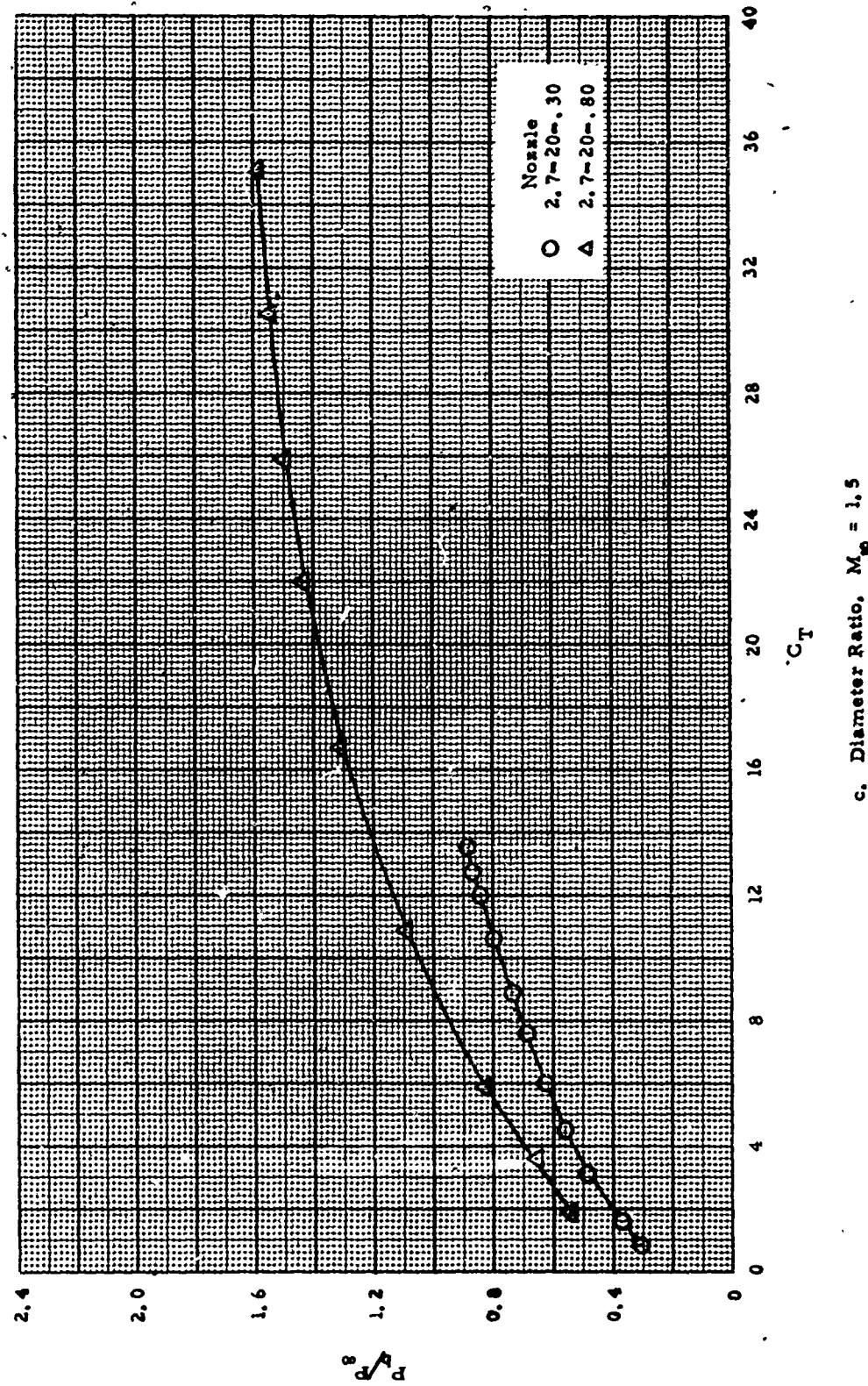
c. Diameter Ratio, $M_\infty = 1.5$

Figure 6. (Continued)

53
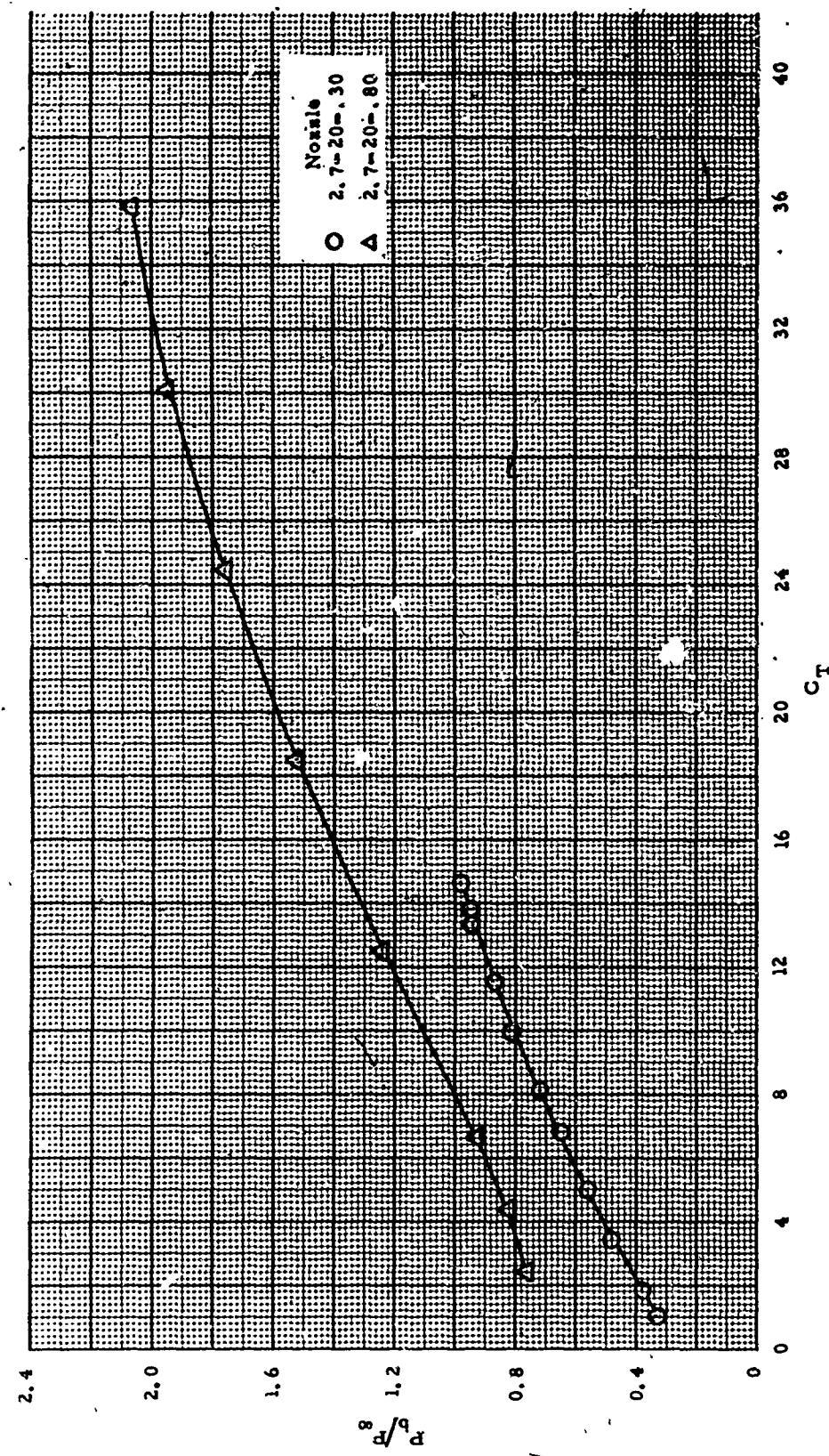
d. Diameter Ratio, $M_\infty = 2.5$

Figure 6. (Continued)

54
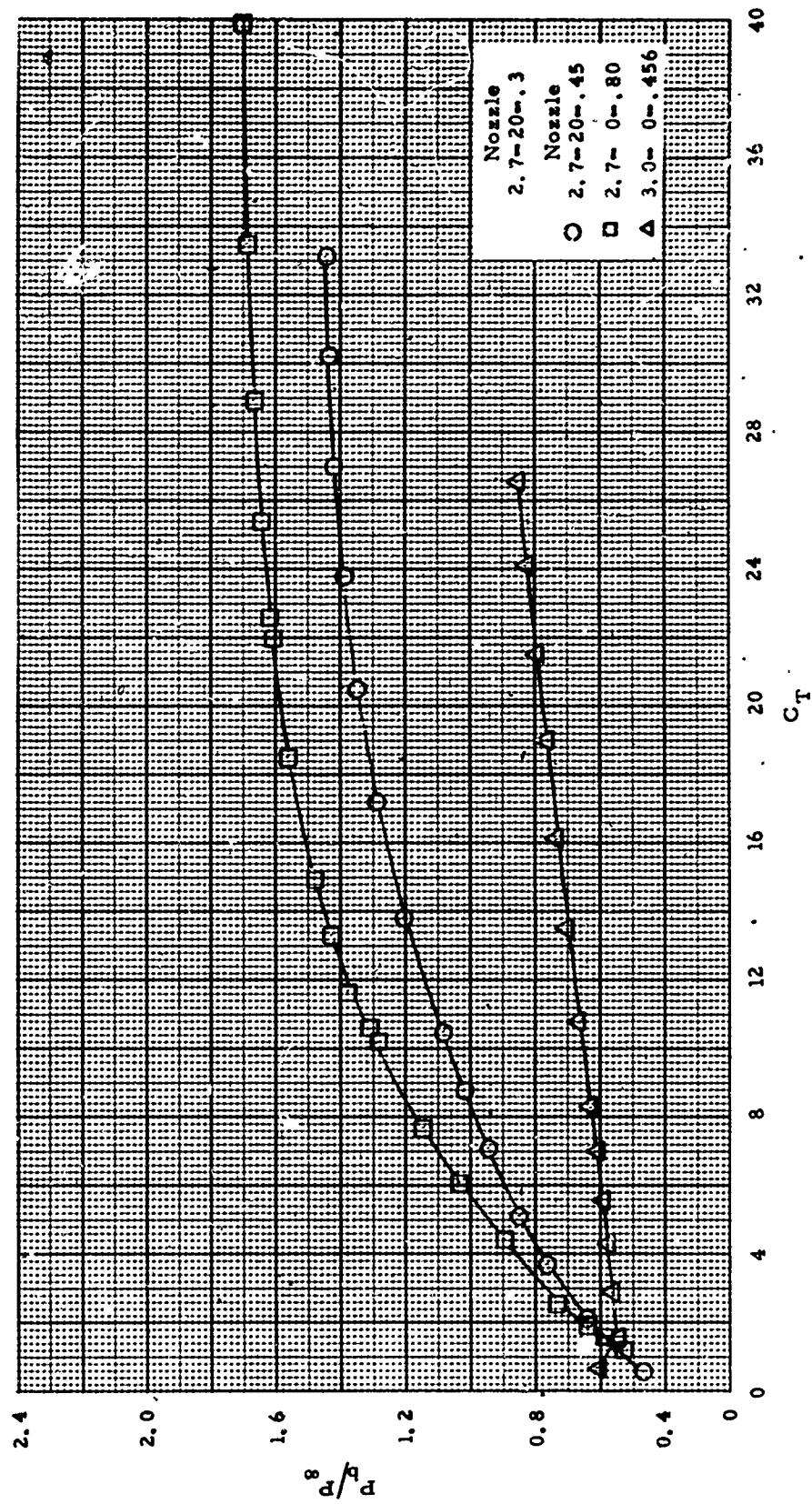
e. Conical Nozzle Compared to Contour Nozzle. $M_\infty = 1.50$
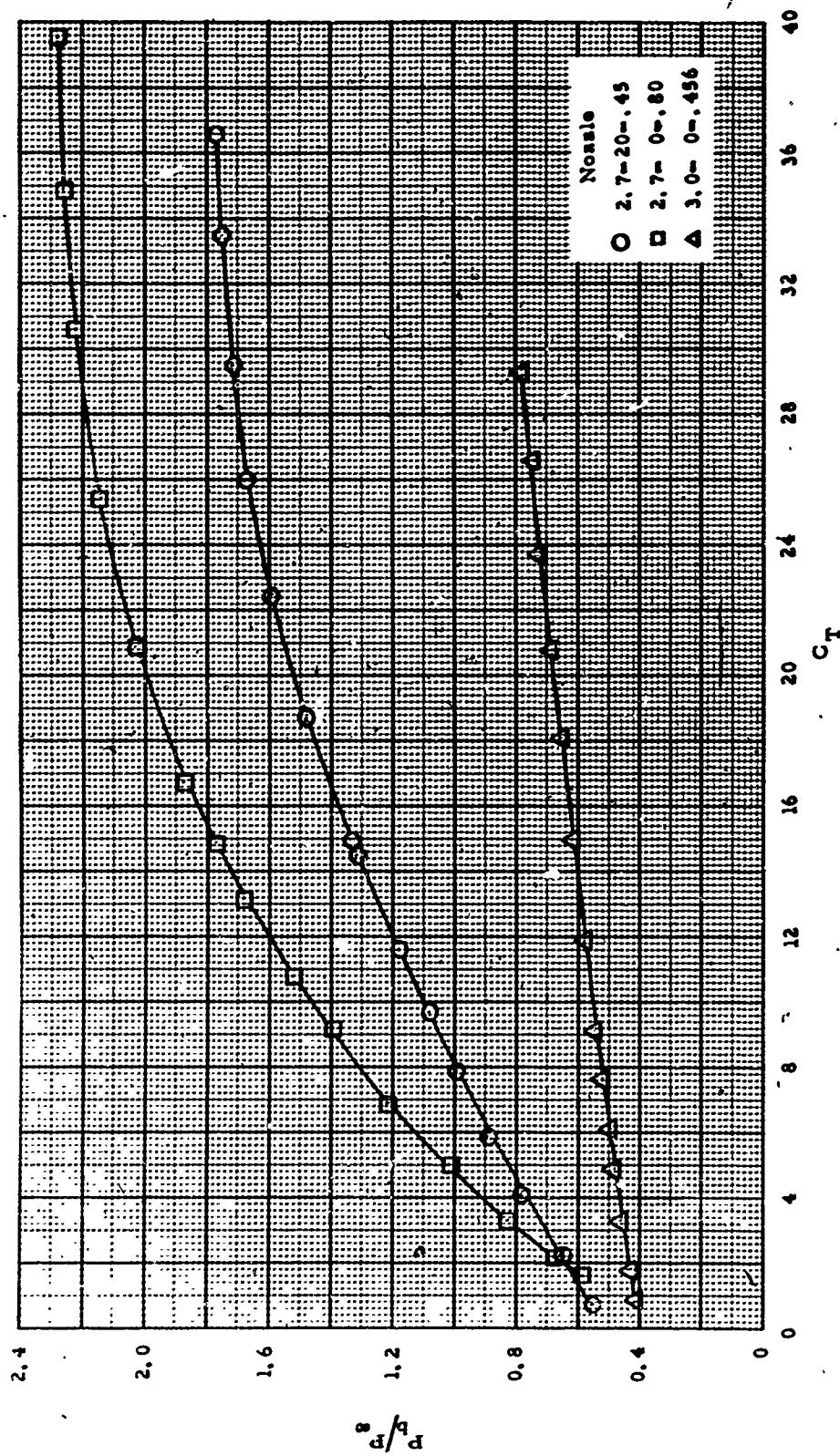
Figure 6. (Continued)

55

f. Conical Nozzle Compared to Contour Nozzle. $M_\infty = 2.5$

Figure 6. (Continued).

56
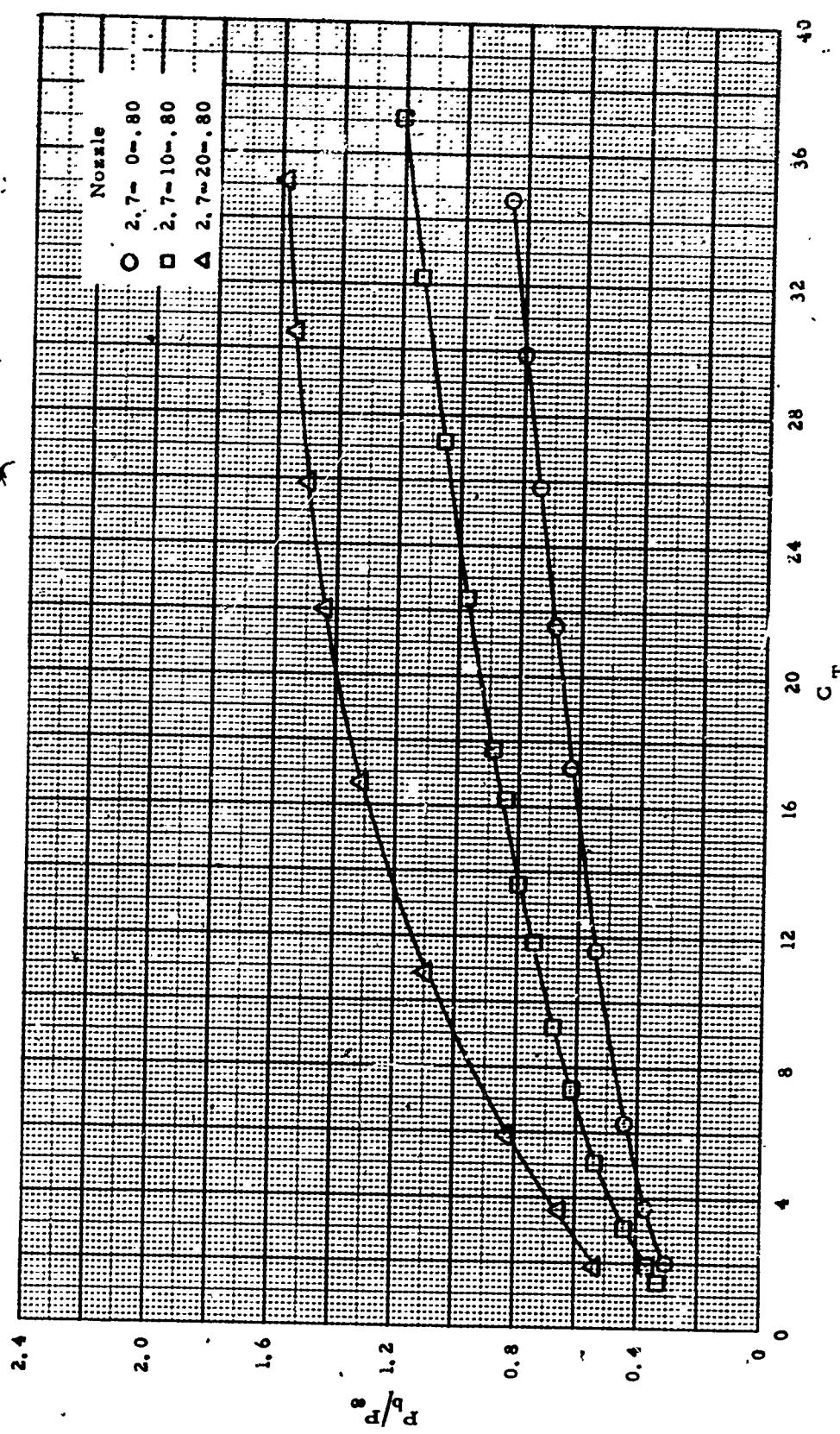
g. Effect g. Nozzle Expansion Angle and Conical Versus Contour Nozzle, $M_\infty = 1.5$

Figure 6. (Continued)

57
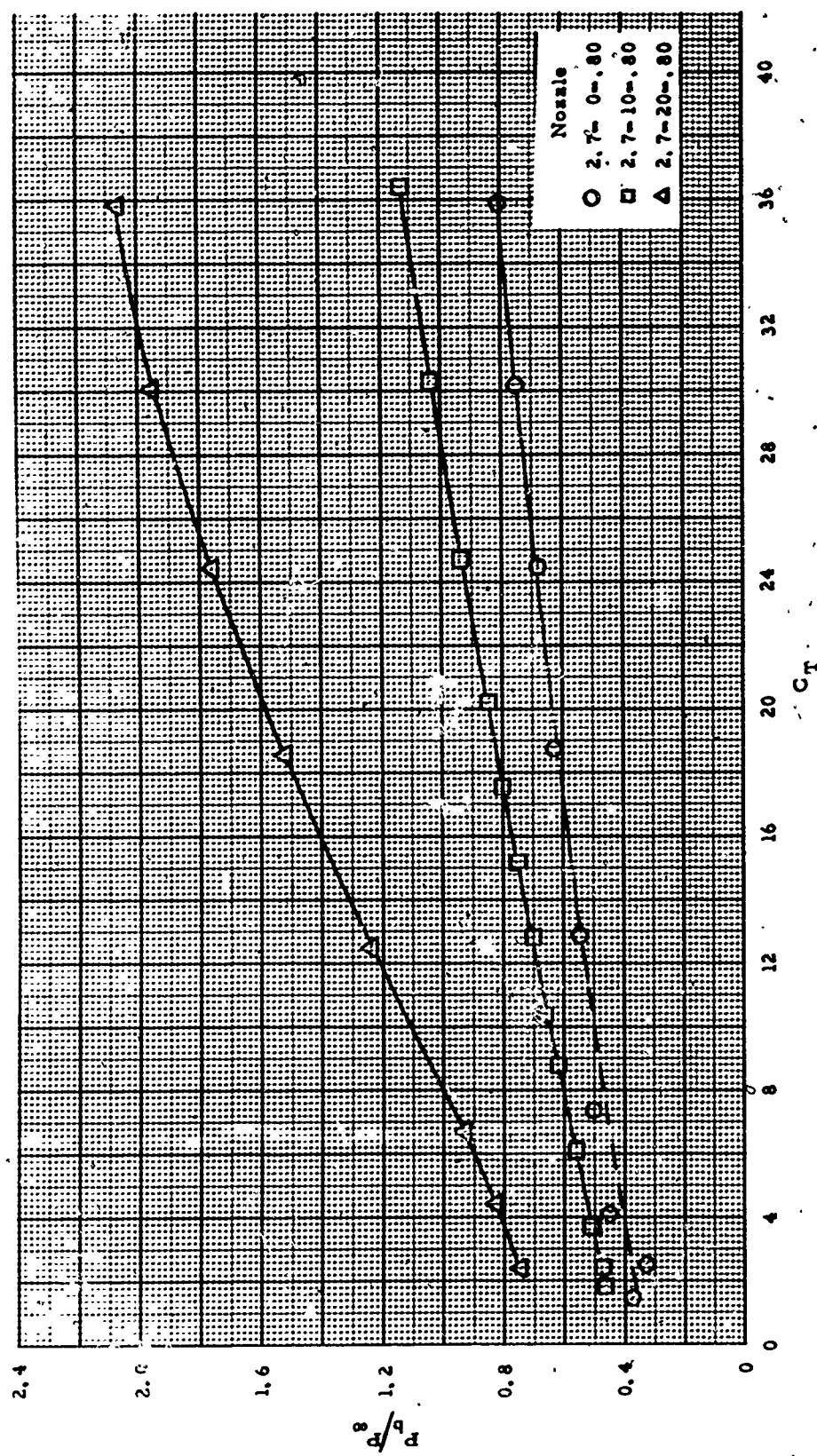
h. Nozzle Expansion Angle and Conical Versus Contour Nozzle. $M_\infty = 2.5$

Figure 6. (Concluded)
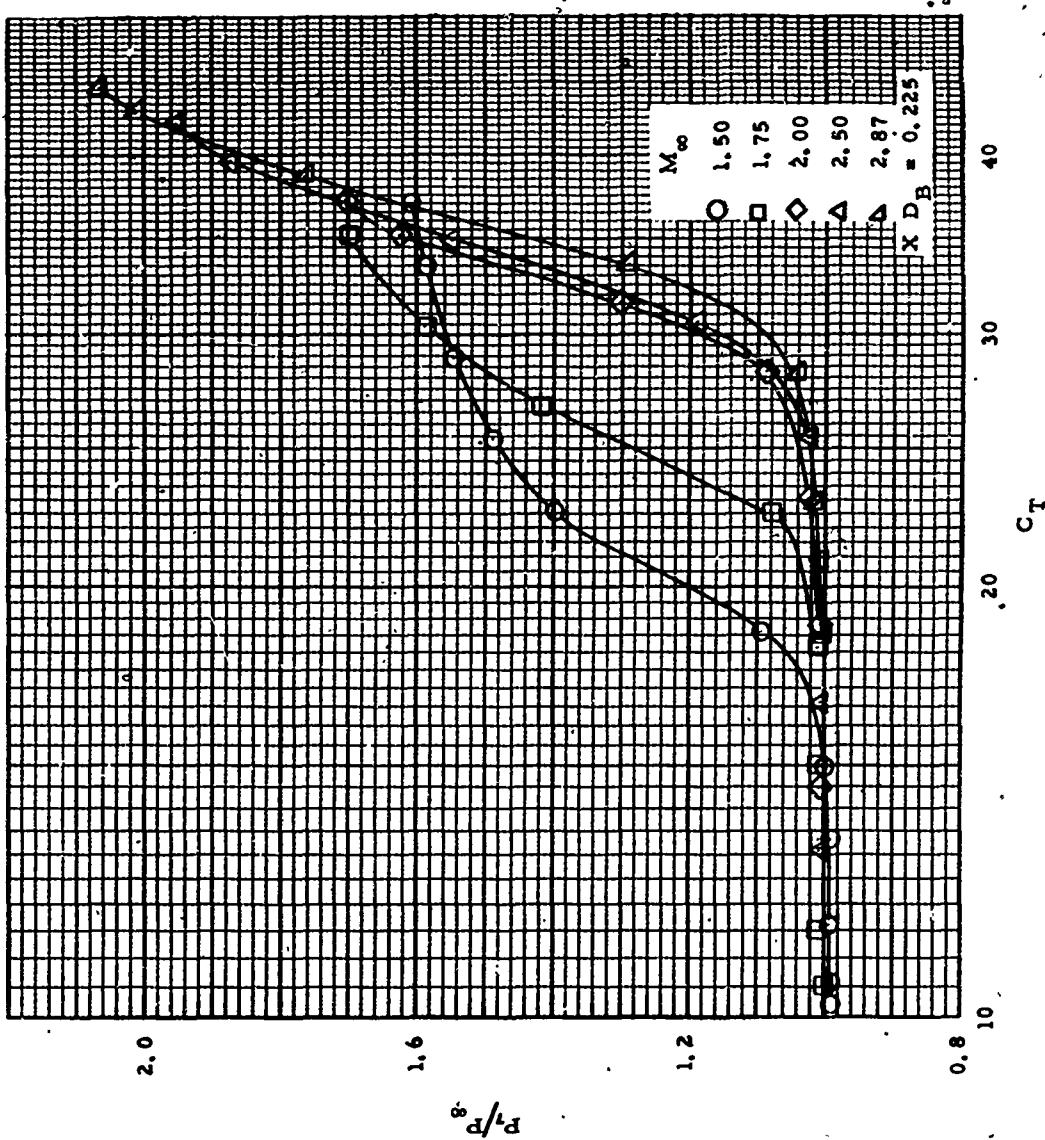
Figure 7. Pressure Ratio At Station 7 As A Function of Thrust
Coefficient for Configuration 1. 0-0-. 45

59
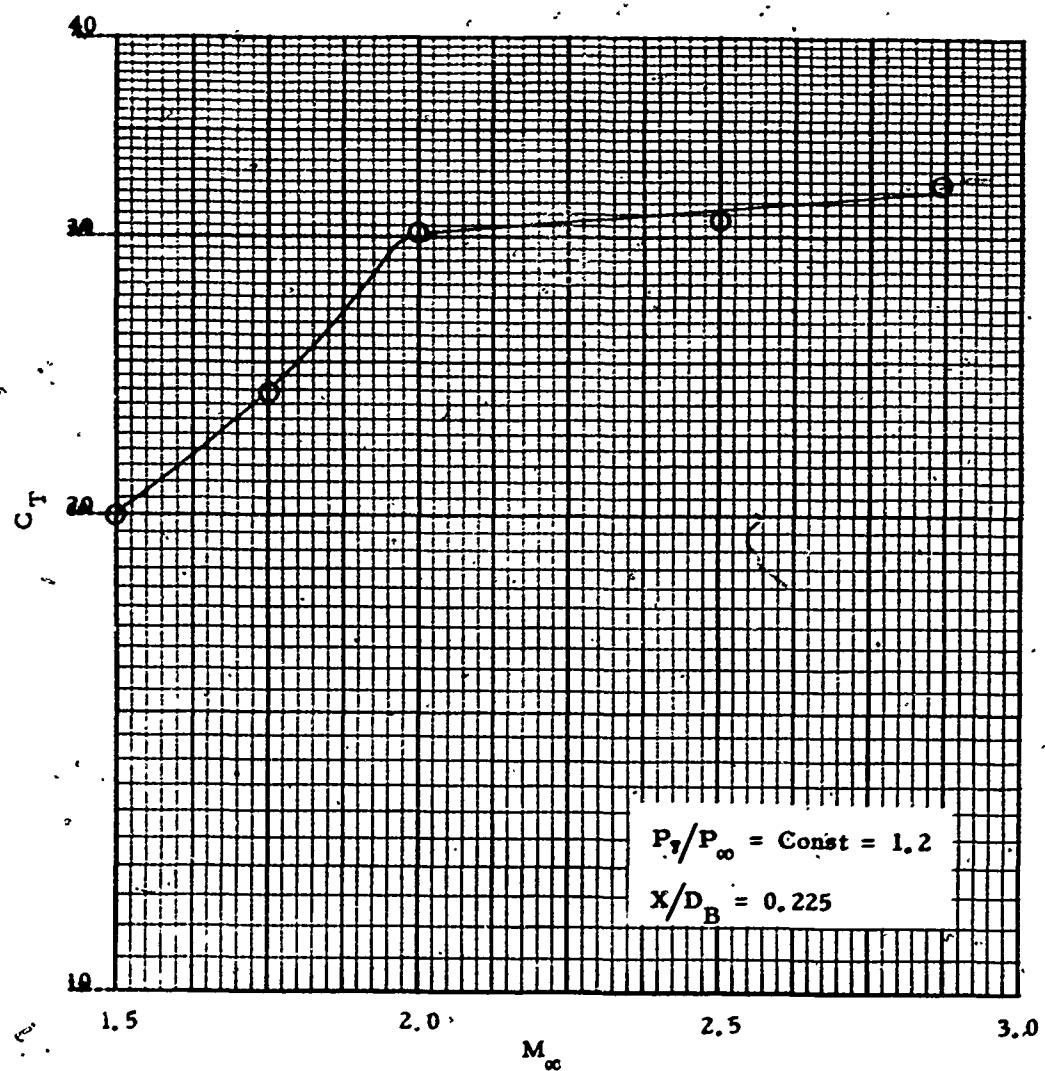
Figure 8. Thrust Coefficient Required For Flow Separation At Station 7 On Configuration 1.0-0-.45 As A Function of Free Stream Mach Number

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62

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY *(Corporate author)*	2a. REPORT SECURITY CLASSIFICATION
Advanced Systems Laboratory Research and Engineering Directorate U. S. Army Missile Command Redstone Arsenal, Alabama 35809	Unclassified
	2b. GROUP NA

3. REPORT TITLE

AN EXPERIMENTAL INVESTIGATION OF BASE PRESSURE ON A BODY OF REVOLUTION AT HIGH THRUST LEVELS AND FREE STREAM MACH NUMBERS OF 1.5 to 2.87

4. DESCRIPTIVE NOTES *(Type of report and inclusive dates)*

Technical Memo

5. AUTHOR(S) *(First name, middle initial, last name)*

Joseph C. Craft

Charles E. Brazzel

6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
31 July 1970	73	13

8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)
b. PROJECT NO. (DA)1M262301A206 AMC Management Structure Code No.	RD-TM-70-6
c. 5221.11.148	9b. OTHER REPORT NO(S) *(Any other numbers that may be assigned this report)* AD
d.	

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11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY
None	Same as No. 1

13. ABSTRACT

An investigation of axial jet effects on the base and afterbody pressures on a body of revolution has been made at free stream Mach numbers of 1.5, 1.75, 2.00, 2.50 and 2.87. Variations were made in nozzle and afterbody geometry while chamber pressures were varied from zero to 1000 psia. For the larger nozzles, sufficient jet mass flow was emitted to cause boundary layer separation on the body surface.

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14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Axial jet effects						
Afterbody						
Bodies of revolution						
Free stream						
Mach numbers 1.5 – 2.87						